NATURE MAGAZINE

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JANUARY · 1936

TO STIMULATE PUBLIC INTEREST IN NATURE
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WINTER STOREHOUSES

John Lindsey Blackford

OKLAHOMA CACTUSES

Marion Sherwood Lahman

MANY KINDS OF MIRAGE

Charles Fitzhugh Talman

THE NEW YEAR IN THE HEAVENS

Isabel M. Lewis

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Whose Wildlife?

Too Many Cooks

Our Beaver

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Photographic Notes

BY SAMUEL BROWN

Winter Photography

While the winter months limit our Nature photographic activities to a minimum, they do present a season during which pictures of unlimited charm can be taken. Ice and snow in its many phases of scintillating beauty hold incomparable opportunities. In addition, a little-explored field is opened—that of photographing the tracks of wild animals.

All the skill in exposure, lighting and composition at the command of the photographer must be called into play to produce negatives that can do full justice to a beautiful winter scene. The registration of delicate tonal gradations is of primary importance.

The most beautiful effects are produced when snow has fallen in still air and has lodged on branches of trees and shrubs. Another charming effect is common if rain falls during freezing temperature. Everything becomes coated with ice, icicles form and, with the sparkle reflected, produce an enchanting and almost unbelievable fairyland of beauty. These scenes, even to the non-artistic, are readily recognizable as most unusual photographic opportunities. To photograph them so that they retain their full glamour is a problem. The employment of the finest technique, from the exposure through development and printing, is required.

Under any condition, the lighting of a subject is of extreme importance, but in a snow scene or ice scene, lighting assumes a vital aspect. Critical study of lighting preliminary to and during viewing in the ground glass should be practised. Shadows are of interest and this is a good time to study this phase of winter photography.

The composition of the scene is usually a deciding factor in the success or failure of the picture. Care must be exercised or the picture may result in a jumble of conflicting, crossing and interlacing lines without any center of interest. As usual, simplicity is the keynote of success.

One should not delay, even for the shortest time, to make his pictures of winter scenes. The sun often melts ice or snow within a short time after it has fallen, or the wind may remove the snow from the branches.

On the technical side, a good orthochromatic film, such as Verichrome or Plenachrome, is recommended. A filter is quite desirable because of the overabundance of blue and of the great amount of ultra-violet light reflected by snow scenes. A light yellow filter, such as K-1 or K-1½, is good but sometimes a deeper filter, such as the K-2, can be used to advantage, particularly when there is much snow or when detail is required in a dark foreground object as a tree trunk. Filters make it possible to register gradations in even dark parts without spoiling the quality renditions of the snow.

As regards the use of filters, exposure should be sufficiently increased to record the darks properly without prolonging development. Over-development causes a loss of quality in the highlights and gives harsh contrast. Recommended factors for the filters mentioned, when used with Verichrome or Plenachrome films, are: K-1, 2½; K-1½, 4; K-2, 4½.

A STUDY IN WHITE TAKEN ON SUPER SENSITIVE PANCHROMATIC FILM AT F.11. ONE-FIFTIETH OF A SECOND

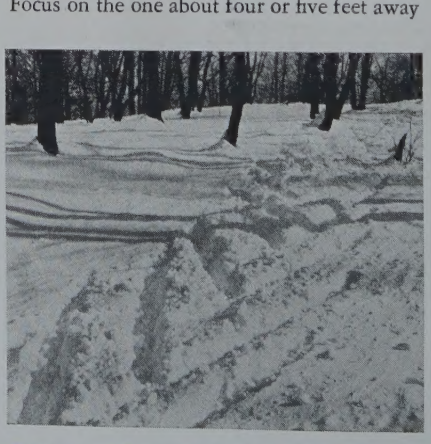
Correct exposure is an important consideration. Because of the power of snow to reflect light, one is inclined to over-expose. A practical method for calculating exposure is to allow half as much for the same scene, under the same conditions, if the ground were bare, providing a dark object in which detail is desired is in the foreground. One-quarter as much exposure is sufficient when there is no near object in which detail is required.

Last, but not least, is the need of a sunshade for the prevention of fog. These are inexpensive but a practical one may be made with black paper and an elastic band.

Animal tracks present an interesting winter time photographic opportunity. These are best taken the morning after a snowfall. It is interesting to identify an animal by the tracks it leaves in the snow, and often a story of a search for food can be read from these.

Pictures of tracks should be taken leading away from the camera but not in a line with the center of the picture area. A slight diagonal is to be preferred and, if possible, a curve in the track. A group of several tracks hold much story telling value. The sun should be low so that each print will be sufficiently shaded to produce distinct contrasts.

The camera should be placed on a tripod a few feet from the first print to be recorded. Focus on the one about four or five feet away and then stop down the lens to get depth of focus. Include as many tracks as possible.



SNOW SCENE, NATIONAL GRAFLEXED BY KARL FRANK ON VERICHROME FILM AT F.16, ONE-SIXTIETH OF A SECOND

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Focal Plane Shutters

In our November "Photographic Notes", the rotary and diaphragm shutters were discussed. There remains one more popular type that has greater efficiency than either of these two—the *focal plane* shutter, so called because it operates as close as possible to the film or focal plane. Some of the cameras that are standardly equipped with focal plane shutters are the Leica, Contax, Graflex, etc.

Focal plane shutters are of two varieties. The first consists of one opaque curtain with several slits in it ranging from the full width of the film to about one-eighth of an inch. The rapidity with which one of these slits passes before the film gives the various speeds. One of the openings is brought into position by one or more turns of a knob. A tension spring is then set which determines the speed with which the particular slit will flash in front of the film. In the Graflex cameras, four openings and six tensions produce twenty-four speeds ranging from 1/10 to 1/1000 of a second.

The second kind of focal plane shutter consists of *two* curtains and only *one* tension. In this shutter, the length of exposure is determined by the relation of one curtain to the other forming the width of the slit. This relation is adjusted by a knob which fits into a number of grooves or locks. There are seven or eight of these giving a range of speeds from 1/20 to 1/500 of a second. This type of focal plane shutter is found on National Graflex and Leica cameras.

As explained in our last shutter article, even the finest spring shutter takes time to open and close and, for this reason, can never be 100 per cent efficient. With focal plane shutters, however, the maximum efficiency can be reached because it is *always* fully open. It is estimated that focal plane shutters pass one-third as much light as between lens shutters in a given time.

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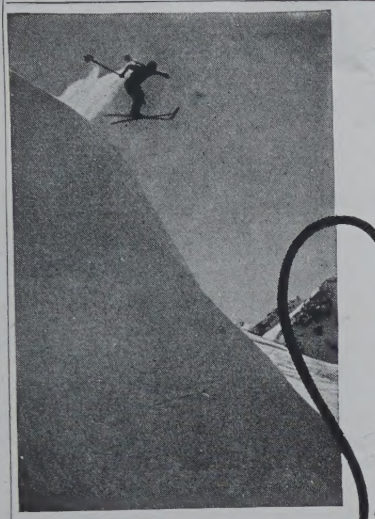

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For the Aquarist

If there are any questions that Ida M. Mellen and Robert J. Lanier have not thought of to ask and answer in *1001 Questions Answered about Your Aquarium* they probably were not worth the asking. They deal with aquarium fishes in general, the fresh-water aquarium, tropical toy fishes, gold fishes, European fishes, northern native fishes, the salt-water aquarium and the fishes found in the brackish water of the North Atlantic. Their treatment in form of questions and answers is thus divided into chapters. The book is supplied with a considerable and excellent index, which is vital in a book with such an approach. It is published by Dodd, Mead and Company at $3.00.

While we are on the subject of aquarium fishes and aquaria, a word is inspired by the receipt of the latest issue of *Aquarium News*, edited by George H. Sly, Jr., at 100 South Avenue, Rochester, New York. It seems to us that Mr. Sly is directing his magazine to the many who have a comparatively limited background in aquarium management. Often material on the care of tropicals presupposes too much knowledge on the part of the reader. It seems to us to be a wise idea to be sure that there is a certain amount of comparatively elementary information available for the newcomer.

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January

WHEN John Keats, casting the spell for his tale on The Eve of St. Agnes, wrote:

The hare limp'd trembling through the frozen grass,

he created an enduring image of the "bitter chill" of that January night. The matter-of-fact lot of rabbits during the cold days and nights of midwinter may, however, be found by the outdoors person of all seasons to be much less severe than that of the animal so distressed on the night when Porphyro and Madeline "fled away into the storm." The god Janus, perpetuated in man's memory by the name of the month, is fabled to have looked forward with a face of youth and backwards with a face of age to the more abundant life of the future and of the past; yet even about us in January there is an abundance of life with a marvellous variety of activity peculiar to one of Nature's most interesting phases.

Unless he chances upon some diseased individual, the one who goes into the woods or fields in January will see no evidence of limping hares, but, rather, in the snow he is likely to find trails telling stories of fast movement, and better than at any other season will be his opportunities to catch sight of the makers of the tracks. Crisscrossing in a maze to confuse any follower, rabbit tracks may have interspersed with them a pair of small tracks that tell of pursuit by a weasel, bounding along, its hind feet falling in the prints left by its front ones. Perhaps the rabbit tracks may be those of the broad feet of a varying hare, or snowshoe rabbit—an animal that in winter is white like the weasel, even whiter, for the tip of the ermine's tail is bright black, catching the observer's eyes and making even less apparent the animal's outline against the white background of snow. Perhaps the tracks may be those of the familiar cottontail, and it may be that in place of the weasel's trail the watcher may find the loping tracks of a fox.

The mink, marten, and otter, too, are alert during the cold months, and gray squirrels and red squirrels leave tracks in the snow that tell of continued activity. The white-footed mouse may need to add provisions to its dwindling store of linden nuts in its warm burrow in the earth, and if so it leaves with its tail a well-marked trail, perhaps toward a white birch tree that has scattered seeds on the snow—and home again, unless the snow tells of tragedy for the woods mouse. The top layer of the unspeakably marvellous, always six-sided, delicate snowflakes may also show the light trail of tiny shrews that are amazingly active in the coldest weather, finding insects in the snow; feeding on leftovers from the kills of other predators; and leaving the most delicate trail of all. Protected by the amazing warmth of the blanket of snow, the meadow mice may have their nests and extending galleries in vegetation on the surface of the winter earth, places of departure and quick return, as told by the tracery left on the upper surface of the snow at night. And deep in the ground, below the frost line, the moles are still burrowing. Certainly the wildlife activity of winter is not confined to the chickadees and other birds so conspicuous.

For in January the four-footed creatures seem for once to attract more attention than do the flying creatures. Among the birds there are in any area probably fewer arrivals or departures from or to other latitudes than during any other month, the population remaining relatively stationary but for an occasional visit of snow bunting or snowy owl driven south by unusually severe weather. A warm day may amazingly produce a mourning-cloak butterfly, and on a sunny afternoon of one of the lengthening days a big brown bat may venture forth. But the sight of winged fourfoots is rare during the winters of cold climates. Red bats have probably migrated southwards, like many of the feathered flyers, and little brown bats in thousands may be hibernating in some cave.

Toward the end of almost any extended excursion on a cold January day—in spite of the lingering exhilaration brought by the frosty air and still with a welcoming appreciation of Nature's winter moods—one is almost certain to linger on the thought of the animals that pass the winter unconscious of the cold. It is easy then to recall the record of a hibernating woodchuck so independent of outside conditions that deadly carbonic-acid gas proved harmless, though the experimenter left the animal in the gas for four hours. Perhaps the possibility of such complete and long-lasting dormancy as the woodchuck's, or that of the jumping mouse that spends about half of the year in its cosy underground nest, is not as pleasant to contemplate as that of the raccoons that curl up by families in the ample quarters of a large hollow tree to spend only such parts of the winter as are coldest—or that of the bustling chipmunks that also are likely to respond to warmth of any great duration. The thought of the beavers and the muskrats, in specially prepared winter quarters, beyond the reach of cold and yet alert to such social opportunities as their arrangements permit, is also likely to come pleasantly on a winter evening. And as all of Nature's marvels have instances the wonder of which seems most exquisite and most intimately associated with one's personal appreciation and worship of Life, so the account of the black bear in its winter confinement giving birth to blind, naked young, scarcely six inches long and less than a pound in weight, seems to bring to one the most significant incident in the natural history of hibernation.

The thought of the large and competent black bear beginning life in a condition that seems so helpless, beginning it in the dead of winter, in January, is as exciting and as momentous as the sight of swollen flower buds on the silver maples or the revelation of the rosettes of mullein, hawkweed, tall thistle, or aster that are bright green beneath the snow—all ready for the first spring urge.

—By HOWARD ZAHNISER.

THE LONG-TAILED CHICKADEE ABOVE AND THE ROCKY MOUNTAIN CHICKADEE BELOW, "A HAPPY TROOP OF OPTIMISTIC LITTLE ACROBATS"

V.27

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By JOHN LINDSEY BLACKFORD

Illustrated by Edmund J. Sawyer

WINTER'S storehouses, how strongly locked and closely guarded they are! Entered when at all by secret passages and byways, opened finally by cleverest ruse or wondrous turnkey. Observe, for example, the crossbill's way into the pine cone's treasure, the pileated woodpecker's great bill with which he can drill to the borers deep within the heartwood.

Larders of the wildfolk, a subject seductive and inviting to any Nature lover—the cony's haymow, the beaver's submerged brush and cordwood, the willow shoots and birch twigs that sustain the moose, and of them all none with more secrets than the ones disclosed to our feathered friends. And, since even storehouses might lose their lure unless we at the same time share attention with those who have discovered the open sesame to them, I took the trail one morning in January and, as they turned the magic key, followed the birds into their storerooms.

How vividly the memory of that journey comes back to me! I had started for the cabin that morning beneath low leaden clouds that betokened the coming snowfall. Soon I was leaving the lower foothills and entering the densely-wooded higher ones. From the valley these graceful landforms are ever alluring to the eye, their dark virescent slopes rising one behind another, their contours merging into purple distances, while back of them the rock-girt ranges of the Kootenais stand up grandly into the sky.

By the time I was atop the first rise the flakes were descending idly but presently came down in a driving smother. The heavy snow crust had afforded fine footing but by four o'clock ten inches of new snow caused one to flounder upon the hidden icy surface. I paused, surveying the stately white-robed evergreens that climbed the slopes on each side.

Suddenly, high on the giant hemlock above me an overladen branch bowed lower beneath its burden of powdery snow, then, released of its load, it sprang upward. Below, other branches, bent to breaking, whipped back wildly as the white cataract gathered momentum, swept more snowy loads into its train, and plunged downward toward the great boughs near the ground. The snow cascade came silently, swiftly, catching me in a miniature avalanche. I could only pull the collar of my heavy mackinaw tighter, close my eyes, and in a sense enjoy the small blizzard that enveloped me. Its freezing breath rushing down swirled upward again, carrying snowdust to a height of fifteen feet or more. A few boughs from nearby trees unburdened themselves and then there was silence once more, not stillness, but the peculiar subtle silence of a snowstorm in the deep woods.

Brushing the dry snow from lashes and cheeks I shuffled on again in the cold. Now and then other avalanches slid down from off the roof of the forest. Many of them I managed to elude by leaping in under a tree, finding shelter behind its trunk; some stole down so softly as to bury one from sight for a moment or two in their chill clouds of whirling snow. Still the pelting flakes fell as early darkness crept up the ravine. Only the end of the cabin roof peeped out from under a high mound of snow as I plodded wearily into the small clearing.

A second day of steady snowfall was followed by a gray dawn with low, formless clouds. At noon the sun

was but a circle of lighter gray in the dull sky. Yet, for me, the morning could scarcely have seemed brighter when, from the steep northern slope where the hill began climbing to its greatest elevation, the loud clarion call of a western pileated woodpecker sounded on the zestful air. He who is the emperor of his tribe of the North American Cordillera is a woodsman of amazing skill. From a stand of balsam comes the high piping of a nuthatch; and presently, as a flash of black and white retreats in bobbing flight, I pursue, ploughing my way slowly, to discover Batchelder's downy peering with bright eye around the trunk of a yellow pine.

What a part the tree trunks perform in the economy of bird-life! Even the briefest jaunt into the winter woods must impress upon one that the largest proportion of our snowtime residents are of those species with strictly arboreal habits. Hidden in the lichen growths, under the scales, in the crevices and furrows of the bark, and in its soft inner portion, the phloem, beneath it in the cambium layer, or in the sap and heartwoods, our tree-tapping citizenry and their associates find the stored food on which they winter through.

Now downy is at work again, flecking off pieces of russet-yellow bark, hitching himself upward in the course of his inspection. The Rocky Mountain hairy and the northern hairy woodpeckers, which intergrade in our northern Rocky Mountain region, are also industriously at work in these forests in winter. In fact so well have the avian folk adapted themselves to winter's rigorous ways that the number of species able to maintain year-round residence in high temperate latitudes has become multitudinous.

THE ROCKY MOUNTAIN HAIRY WOODPECKER INDUSTRIOUSLY AT WORK

During these short gray days when warmth and energy are so vital, the woodpeckers dig out and devour the beetles, moths and the wood-boring larvae of these many tree-killing and timber-destroying pests. Among the many items on their menu are the western pine beetles, Douglas fir beetle, the wood engravers, cedar pole borer, the pine and hemlock flat-headed borers, the fir bark beetle, the western cedar bark borer, the western larch borer, the black-horned pine borer and, in summer, the carpenter ant.

Emerging from a struggle with brush and loose snow, let's clear a seat on a windfall lying across the dry rivulet and regain our breath. In spring a stream rushes down through the ravine, scouring the moss-grown rocky walls, or meanders through its hidden dales. In autumn and winter, with diminished flow, it creeps from pool to pool beneath its pebbled bed. Drifting down the ravine comes a happy troop of optimistic little acrobats. With amicable inquisitiveness two mountain chickadees inspect their visitor. Several long-tailed chickadees join them and among them is a particularly fine singer. His lucid yet simple notes are a prolonged *dee-dee-dee-dee-dee-dee-dee.*

Dropping down the bole of a white pine appears a pair of Rocky Mountain nuthatches, companions of my merry troubadours. How pleasant to find such boon comradeship among any of the forest's inhabitants at this forbidding season. A heart-warming change, indeed, from the ever-present story of hunters and hunted.

The long-tailed chickadee is a joyous mite who continues to endure his name in the cause of science, because his tail is a quarter-inch longer than those of his relatives. One would think that his pretty black bib and bonnet, the beautiful fawn and buff of his waistcoat, or the lovely little gray shawl he wears, together with his enlivening personality, should have won for him a more appropriate name; but no, his tail is a quarter of an inch longer! For my part I like to call him the black-bonneted chickadee; his appreciation is worth the extra twist of the tongue.

Last I saw him and his playfellows in October, frolicking as they feasted upon seeds extracted from the gold-orange berries of the wild honeysuckle, hanging down-side up from the clusters in their green leaf-cups.

Soon they are off again from peeling birch trunk to maple, to service berry with sage green "bloom" upon its slender stems, to willow, and on to red-osier dogwood. Clinging and swinging they pry here and there under the bark and in the crotches of the limbs, taking toll of chrysalides and pupae and insects' eggs. The fact that they are cold storage eggs does not seem to matter. Not infrequently, the chickadees may be observed high in the tamaracks, gleaning seeds from the small cones.

Other company commonly to be found in the cos-

mopolitan chickadee bands are the modestly-garbed creeper and the golden-crowned kinglet; the latter, a princeling of birdland, wears his orange and gold coronet without fuss, if not without feathers.

Again fortune favors us and arranges next a meeting with a black-eared or pigmy nuthatch. Though not much more than bug-size himself, he is, nevertheless, an insect exterminator of no mean proportions.

Here we stop and investigate the bark of this dying fir. The fine brownish-white sawdust accumulated upon the base and caught in the crannies of the bark, giving it such an unsightly aspect, is the powdery borings or frass pushed out from their tunnels by the bark beetles. Pull off a strip of the rotting wood near this old fire scar; in the litter of wood-dust, old cocoons, insect wings and web material, we can count a dozen torpid spiders and a few beetles.

Hibernating spiders, larvae, moths and eggs of insects are prizes sought also by the red-breasted nuthatches, colorful midget caretakers of the trees. Most expert and skillful are all these bird-folk, and were the trees themselves to say, I am sure they would ask for no cleverer detectives.

Under Winter's rule there is no goal of safety to be attained; every individual and every species is always on trial, each hour of existence must be won, each day of survival must be earned. The deep woods are beautiful, and not until we experience some mishap or accident in them, do we realize the cold, grim savagery of the winter season. In the North spring is only for those who can run the gauntlet of winter. The season of cold is Death's ally.

A TROOP OF CLARK'S NUTCRACKERS

Ahead a ridge devastated by fire two summers ago appears like a huge porcupine climbing the mountain side. Up and along the hillside we go toward it, soon to plunge into a thicket of young fir. There is less snow on the ground but progress must be made in a kind of jack-knife fashion bending under and brushing through innumerable dead branches. Parallel with the gradient, connecting and intersecting one another, are many paths of the varying hare. Their snowshoes give them good service on this feathery snow, nor do they ever need to take them off and carry them when slipping through such tangles; considerations that caused me to leave my racquets at home. Out and up into open glades of western yellow pine until finally we are among the lodgepoles and at the edge of the giant pincushion.

Its maze of deadfalls beneath the snow would test the vocabulary of any who should attempt to cross it. Skirting its border, clambering over an occasional windfall, we presently hear an intermittent tap, tap, tap, telegraphing to our ears the presence of another member of the woodworking fraternity. We may rightfully expect the interview to be with one or another of that three-toed triumvirate of the boreal zone that includes the Alpine, the Arctic and the Alaskan three-toed woodpeckers.

It is no easy matter to detect the black and white bird with yellow crown patch on a bleached and blackened trunk. But his energetic drilling leads us to the spot to find there the Alpine three-toed. This friend of the trees occurs in the mountains from British Columbia and Montana south to Arizona and New Mexico. On his bill of fare as he takes them from his storehouses here in the burn we may expect to find the pine sawyer. This destructive insect is quick to take advantage of burned areas, slashings, windthrows and evergreens ravaged by defoliators before salvage can be made, resulting in a large amount of culled lumber.

ABOVE, THE ROCKY MOUNTAIN NUTHATCH. BELOW, THE RED-BREASTED NUTHATCH

The Arctic three-toed woodpecker

OTHER COMPANY OF THE CHICKADEE BAND INCLUDES THE GOLDEN-CROWNED KINGLET

is a regimental leader in this business of bug control, while the Alaskan three-toed, which ranges from Alaska and the western Mackenzie southward to Montana and Oregon, though rarer in occurrence, accomplishes work that is noteworthy. They are year-round foes of the mountain pine beetle whose attacks are described as "epidemics", and which are accountable for almost yearly outbreaks in stands of sugar, lodgepole, western yellow and white pine, from the Sierras of central California through the Rockies into Canada.

Around the devastated area and down the opposite side of the ridge we go until we are again among the yellow pines. Presently we are attracted by the sound of raucous good fellowship, and espy a troop of Clark's nutcrackers in the tops of two great trees. Some are eating busily. Clinging with tenacious hold to swaying branch they reach out and with powerful claws grasp a wobbly cone, and rapidly strip away the scales, pounding dextrously with the stout beak. Again they may twist off the cone, letting it fall, and drop down to carry it off to a place of vantage where they may garner the kernels with less difficulty. Fir and other cones, too, are their storehouses. As we watch them only the glossy black of wing and inner tail feathers mark their gray forms against the gray sky.

On down we go slipping and sliding, then along the face of a broken rock wall where frost-weathering is slowly building up a steep talus slope at its base. At last we reached the ravine and soon are hitting the back trail.

Then so often there comes a day at the cabin when the sky is clear and only a cloudlet or two drifts upon its azure blue. The bright sunlight sparkles and glints upon a white world and all of Nature causes us to marvel.

The night comes majestically, lighted by a million glittering stars. Then, later, standing beside the cabin door, gazing out upon the silvered dark, drinking in the beauty of a moonlit wilderness, captivated by the wonder of it, we realize the truth—we are living a miracle.

During a stay at the cabin one is likely to find feathered callers at his door, visitors that readily communicate by their actions that their storehouses are quite empty, and do you mind if they have a look around in yours? Gliding down from the branches like miniature monoplanes, come the Rocky Mountain jays, and soon with persuasive naïveté they are helping themselves from unguarded food, or from your lunchbox, or else you are feeding them yourself. In such matters they always extend a glad hand and expect a handout and you are ready to grant it.

They are not robbers of camps as the popular name denotes, that is, unless the assumption that you have purposely packed in supplies to replenish theirs is a sadly erroneous one. Instead, and I know them well, they are just forest footpads and withal most likeable ones. When lean days come and hoarded stores are gone, the meat bird, as this jay is often called, can subsist on buds and berries.

Of similar food habits is the black-headed, a form of Steller's jay. More retiring than the majority of his family and with a manner more in keeping with his courtier-like appearance, he is, nevertheless, well entitled to be styled the Beau Brummel of our backwoods. This splendid fellow, clad in lustrous plumage of rich Prussian blue and black, furnishes a striking color note to the winter woods.

Pine seeds are a staple with these two jays but their tastes are variable, and the fact that much of the time they appear to be without visible means of support, leads to not unwarranted suspicion among their neighbors later on during the nesting season.

Leaving the ravine on the homeward tramp, one follows the trail in contour fashion along the hillside, plunging down steeply after a mile to where the main creek winds between a double row of the paper-leaf or mountain alders. Each alder and birch catkin is a tiny store chest of Nature's goodies welcomed with enthusiasm by several visitants from the North.

Above the long footlog, the crossing of which is tricky work with its load of loose and crusted snow, is a foaming waterfall, portaled now between pillars of ice.

Look! Teetering on that icy boulder in midstream, half veiled by the mist and spray, is a water ousel. Perhaps only last summer he grew up in a wee mossy hut on some spume-drenched ledge, one of Nature's own water babies; today he fends for himself along the nearly ice-locked stream.

The dipper not only holds more or less monopoly on his food supply as a species, but habitually asserts personal claims to the appanages of a certain part of his tarn, brook, or river. When ice completely mantles the upper reaches of the streams (Continued on page 57)

SABA, THE OCELOT, ALWAYS ENJOYS BEING IN THE LIMELIGHT
She will delay doing her tricks in order to hold the attention of her audience and if it lags will roll into a ball and bite herself to regain attention

SABA: A CIVILIZED OCELOT

By MERLYS BLAKESLEE

SOMETHING small in spots, is one way of describing an ocelot. If you add a pink nose, a long tail and movie-star-size eyes, the ocelot is practically complete enough to scratch you. Unfortunately she has long curved claws for the purpose of scratching. Although I have taught my ocelot some manners, she still persists in leaving her trademark on those admiring visitors who attempt to pet the "kitty".

My ocelot's name is Saba and she was two years old last June. I've had her all but the four weeks in which she was a native of Honduras. Since she is an orphan, I'm interested in her family tree, so whenever we see a woman go past wearing a coat made out of Saba's relations, we say:

"Look, Saba, there goes your Uncle Bill and your Aunt Minnie." But Saba always pretends she doesn't hear.

I do not know whether all ocelots are the same, but Saba is an amazingly clever animal. Whenever she twists her leash around a chair she can walk about the right way to untwist herself. Or if I hide a bone and point to the spot, she goes straight there and finds it. Sometimes, if she is feeling particularly bright, I do not even have to point: I simply repeat the name of the hiding-place several times and she will start investigations there.

People nearly always ask me how I taught Saba her different tricks. The answer is, I didn't. For example, one day she was playing with a carrot top, one of her favorite amusements. I put it in a small box, and after some searching she nosed it out. I went out of the room for a few minutes and when I came back, I saw her hide the carrot in the box herself, then run off and pretend it was lost. She worked up quite a bit of excitement about it, running around the box until she finally opened the cover and triumphantly took out the carrot. That is now one of our favorite games.

Another of her pet tricks is to leap into a paper bag from wherever she happens to be at the moment I hold one open for her. She especially likes to leap into it from chairs, and sometimes she is so anxious to perform that she will jump even before I have the bag open. A fraction of a second before she jumps, she lifts both front paws off the floor, so her spring comes from her hind legs.

All ocelots have large feet and Saba uses hers to good advantage in catching rubber balls. If I take a ball and bounce it high, she will either jump up straight after it and come down with it between her paws, or catch it when it comes down. She misses it sometimes, especially when she has her mind on something else. Or maybe it's just because I tease her about her "policeman's feet" and she wants to show that they are rather dainty after all.

Maybe it is her beauty that makes her so vain, but she is a pure exhibitionist. When we have guests and Saba goes through her tricks for them, she always hesitates long enough to make it seem more spectacular. And if they get tired of waiting or take their eyes off her for something else, she immediately does a trick to attract their attention again. When she can think of nothing else to do to regain the limelight she rolls up into a ball and starts biting herself.

Her diet is rather varied. She likes lima beans and peas, radishes, fish, eggs, meat, milk and bananas. I was

MOVIE-STAR-LIKE EYES
Her spots, long tail and pink nose are the ocelot's outstanding features

told that feeding her raw meat would make her wild, but it has not yet had that effect. In fact she is so civilized that she prefers most of her meat cooked.

However she has tried to take bites out of our house cat, who is certainly "raw meat". We keep the two safely separated. The few times they have gotten into brief arguments together, an equal amount of fur seems to have been pulled from each party. Whether the ocelot really would kill the cat, I do not know. And naturally, it is something I do not care to experiment with.

Saba is a nervous cat whenever she is taken out of her familiar surroundings, so I cannot take her very many places with me. Yet she does not like it a bit if I go away and leave her home for any length of time. She is affectionate and seems to miss me a great deal, so I often wonder if she would quickly forget me if I gave her to a zoo. I shall probably have to give her away in another year when she will have attained her growth; not that I believe she will grow wild, but merely that she will be too strong for me to handle.

I shall certainly miss her when that day comes, because she is an interesting pet to own. I sometimes wish that she would let some person beside myself handle her, so that other people could have half the fun I do, but Saba is strictly a one-person cat.

So if you are looking for a pet and want beauty and grace and a little contrariness, I can recommend an ocelot. But you will have to take your chance on finding one as nice as mine in the market—for it's just an ocelottery.

●

A Stately Pentstemon

By ETHEL MARY BAKER

NONE of our prairie flowers are more impressive than the various pentstemons, and a stately queen among them is *Pentstemon unilateralis*. This proud beauty is not to be found everywhere, but a small native meadow close to our home happens to accommodate several fine clumps.

The stems rise straight and true from the buffalo grass curled so coyly about their feet. Sometimes, when measured to the tip of the topmost blossoms, they grow as high as five feet, but more often nearer three. The lovely blooms of a dainty lavender-blue, in form, if not in color, show their relationship to the snapdragon tribe. Stalking boldly up the slender stem, they appear on one side, first in pairs, then cautiously dwindle out in single file as they near the peak. This pentstemon is splendid for cutting, making a bouquet that rivals in beauty that of the most choice delphiniums from the garden.

Microscopic Green Mansions

A glimpse at the tiny aquatic plants called desmids

By DR. C. WILLIAM PENLAND
and H. F. WERSHING

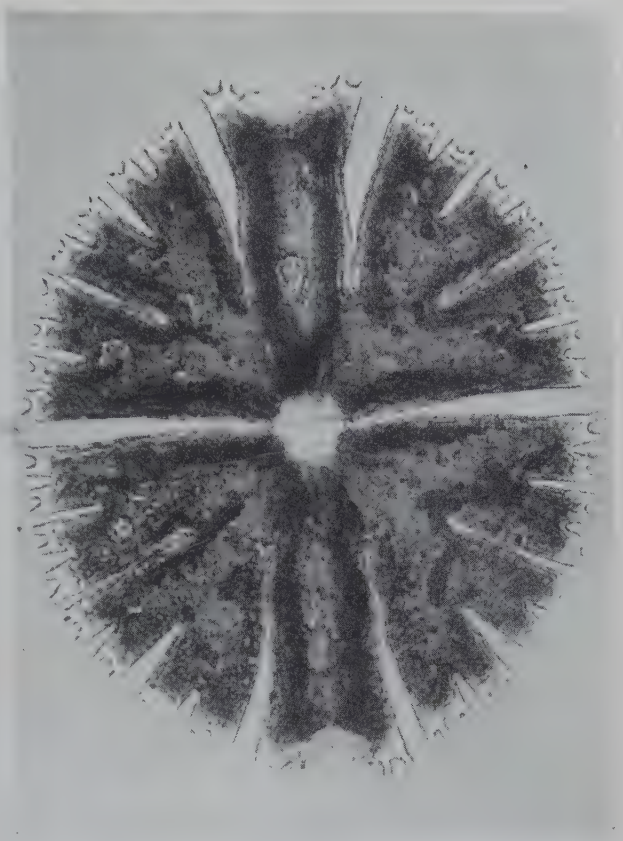
COLLECT a small bottle of greenish scum from a neighboring pond. Then with a medicine dropper place a drop on a glass slide and examine it under the microscope. In this one drop there may be a score or more of different kinds of life. What appears to the naked eye as an amorphous mass of green slime is resolved by the microscope into myriad forms of tiny plant and animal life, each a study in precise structure and beauty.

Among the microscopic aquatic plants, none are more beautiful and interesting than the desmids. Mere green specks they are, but they glisten with a wealth of form and pattern that rivals the beauty of snowflakes. Unlike snowflakes, each infinitesimal bit has life, and is entrusted with it by its Maker to be perpetuated through the centuries.

There are hundreds of different kinds of desmids, which make up only a small group of the simpler plants. Each desmid consists of a single cell with a constriction in the middle that almost cuts it in half, thus giving a semi-cell effect. The nucleus is always located in the narrowest part of this indentation. Usually the entire cell is a rich light green, from its chlorophyll, that interesting pigment that permits plants to make food through the aid of sunlight. Some desmids have their cells united in long thread-like chains, but each cell retains its individuality. Each species has its own distinctive size and shape.

A common type of desmid is called *Cosmarium.* It may be found associated with the green scums in ponds and quiet streams everywhere. One kind of *Cosmarium,* considerably enlarged, is illustrated with a photomicrograph. The generally dark color is caused by the green chlorophyll. The four oval bodies near the center are the focal points of food manufacture and are known as pyrenoids. From them are lines converging to the central constriction within which the nucleus is located.

The scores of species of *Cosmarium* differ in size as well as form. Some may be less than half as large as the one shown in the photograph, but the greatest variation is in form. One species appears as if two pyramids had been placed with their bases close together and then connected by a small passageway. Another shows two graceful indentations in each half cell. These are not, however, as deep as the main constriction. Still another species is shaped like a miniature dumbbell, the entire outer surface being covered with tiny spines or wart-like projections arranged in parallel rows.

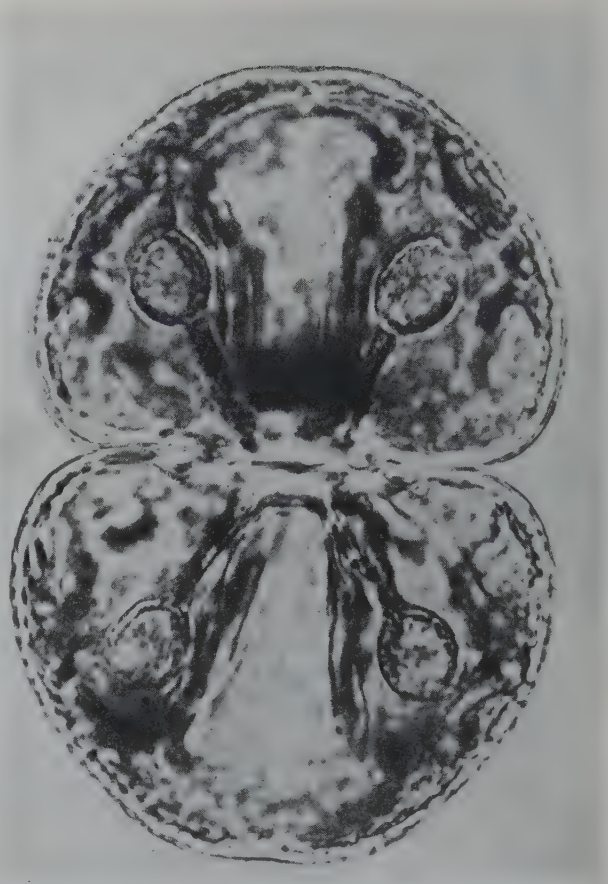


ONE OF THE MOST BEAUTIFUL OF THE DESMIDS
This is *Micrasterias,* which means "microscopic star". We see it here enlarged about one thousand times

Perhaps the most strikingly beautiful of the desmids is the type known as *Miscrasterias,* meaning "microscopic star". When first viewed with the microscope the remarkable sculpturing of this form is enough to cause the observer to gasp in astonishment. It is hard to conceive that a speck of life as tiny as this can retain such extraordinary symmetry, but generation after generation this little green jewel looks much the same. The photograph shows the most beautiful of this group and is enlarged many times.

A few other interesting forms are *Closterium* and *Pleurotaenium.* The former is crescent-shaped and much longer than wide. *Pleurotaenium* is shaped like a cigar and frequently rolls over and over when the water is in motion. In the end of each semi-cell may be found little groups of bodies that remain in constant motion as long as the cell is alive. It has been said that these small granules are of gypsum and that the motion is caused by Brownian movement.

Most of the desmids have a limited power of movement. They secrete a gelatinous substance, usually from the ends of the cells. This tends to push the plant away from the secretion. The most remarkable movement is exhibited by *Pleurotaenium* and others of this same general shape. The secreted mucilage will attach one end of the cell to the substratum. It then waves about with the motion of the water, like a dirigible attached to a mooring mast. The free end, which likewise has secreted mucilage, will attach itself when it makes a contact. The original



A COMMON TYPE OF DESMID KNOWN AS COSMARIUM
This much enlarged tiny plant is typical of the variety of interesting shapes assumed by these plants

attachment will then break loose. In this manner the plant is able to move several millimeters in a day.

These little green mansions ordinarily reproduce by cell division. Each half of the old cell grows a new counterpart. First the nucleus divides; then the new halves start growing at the division point of the nucleus and push the old cell apart in the middle. This growth continues until the new semi-cells have attained the size of the old halves. They may then become broken apart by mechanical pressure or by their own movements in the water.

We see beauty and loveliness in many of Nature's living creations that cover the earth and hide the bleak, cold rock and soil from our vision. In a tree, a flower, or an animal, each cell has sacrificed most of its individuality to give form to the whole. The lower species of life —the single-celled creations—retain all their identity and produce thousands of unique patterns. Many designers have already utilized some of these tiny patterns to weave variety into our everyday life but they have by no means exhausted the possibilities.

Considerable patience is necessary to study these little green creations. A hasty glance into the microscope reveals little, but to the person who exercises care and patience these microscopic plants will be a never-ending source of amusement and interest. The amateur observer can hardly hope to exhaust this wealth of aquatic plant life, because of the number and variety of the species.

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FAIRY TRUMPETS

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By
ESTHER E. REEKS

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ONE of the daintiest blossoms of the West, from the eastern slope of the Rockies to the Pacific Coast, is the *Gilia aggregata,* or fairy trumpet, as it is often called.

These dainty flowers of the Phlox family might well be used by fairies, for their flowers are perfect miniature trumpets with slender tubes often measuring two inches in length. The more common color is pink, but they are frequently seen in other shades ranging from pure white to deep crimson.

The stalks of the *Gilia aggregata* grow from eighteen inches to two or three feet in height with the upper half thickly set along one side with clusters of buds. These open one or two at a time over a blooming season lasting from late spring to the middle or end of summer.

This species of *Gilia* is found growing in open sandy soil at altitudes of from six to ten thousand feet.

PAN-PACIFIC PRESS BUREAU PHOTOGRAPH

NENE, HAWAIIAN GEESE, AND MEMBERS OF A FLOCK BEING GUARDED TO RESTORE THE BIRD

Believed to be descendants of Canada geese that lost their way on a migratory flight centuries ago, they were once numerous; more recently they have been destroyed in large numbers by man and other enemies

NOW THE NENE *By* WILLIAM ATHERTON DUPUY

THE NENE came very near extermination before its name came to be known even to the cross-word puzzle makers. It is a noble American bird, once abundant in its native habitat, but some years ago its numbers had run so low that only two little flocks of a dozen each remained in existence.

The nene is a distinct species of goose that exists only in Hawaii. It is rarer than the Ross snow goose that breeds on unknown far away islands in a brief Arctic summer and goes to California for the winter. There are not nearly as many of them as there are of the blue goose that has a tiny winter home near the mouth of the Mississippi and whose nesting places on Hudson Bay were unknown to man until a few years ago.

The nene long has lost the habit of migration that is common to practically all wild geese. Apparently it has lived the year around in Hawaii for many centuries. When missionaries first went to those islands the flocks of nenes were abundant. As the country settled up hunters slaughtered them in great numbers.

Early settlers in Hawaii say that the nenes had a quality of loyalty to a fellow in distress that contributed much to their destruction. If one of a flock was injured the others would not fly away, but would cluster about the distressed comrade, thus presenting themselves for slaughter by the hunter with a shotgun.

Thus it came to pass that, a few years ago, there remained but two small flocks of domesticated nenes, located on two isolated ranches on Hawaii, the Big Island, down at the end of the chain. It was then that the territorial fish and game commission became alarmed at the near approach of their extermination and took steps to prevent it. Two pairs of the birds were brought to Mokapu, the game farm twenty miles out of Honolulu. They were kept under wire that protected them from the stealthy mongoose and their eggs from certain rats that are given to robbing nests. This little flock has now grown to three dozen, which forms a nucleus against extermination.

The history of the Hawaiian goose, the manner in which it came here, is unknown, but scientists believe it migrated from some continental area and the nearest such land is the American continent. The bird itself resembles the Canadian wild goose, whose wedge-shaped flight formation and honking call are signs of changing seasons as it flies over the Mississippi Valley states on its well-timed journeys north and south. The slight differences in size and marking might easily be the result of a long residence in a changed environment.

Although the nearest mainland port to Hawaii is San Francisco, the nearest continental land, in a direct line, is the northwestern projection of the North American continent, Alaska, some 2015 miles almost due north. The instinct of the migratory bird is to fly south, and geese from the western tip of Alaska, flying south, may well have struck Hawaii.

One can imagine a flock of such birds—its great V-shape formation, the hoarse call of its numbers high overhead—veering too far to the right and becoming lost in the vast reaches of the Pacific. The birds became tired; they had flown 2000 miles and more. Here beneath them

was a fair and abundant land that seemed to invite hospitably. They settled down. Time passed and they found life blissfully easy. The salt marshes turned out to be an abundant feeding ground. There were at that time few natural enemies. Likely enough man had not appeared in the islands when the first geese landed there. The rat and the mongoose, which he was to bring later, were not yet there to make life for members of the feathered kingdom so difficult as it later was to be.

The habit of migratory birds is strong. All around the world they leave comfortable surroundings entirely favorable to making nests and rearing their young, strike to the north for thousands of miles, rear their offspring, and laboriously return. The golden plover, a land bird that seldom alights on the water, flies every year from Hawaii to Alaska for its nesting, rears its young and, with instinct as its compass, retraces its way across the vast ocean and finds the tiny dot that is its winter home.

PAN-PACIFIC PRESS BUREAU PHOTOGRAPH

LADY WITH A NENE

Miss Loretta Shea of Honolulu with one of the flock that the commission is trying to increase

But the ancestors of the nene, if they were Canadian geese, must have become confused. Possibly they had lost their sense of direction, and did not know which way to start in response to the migrating urge. Possibly most of the flock did go north and failed to return. It may have been a pair with broken wings that remained behind to start a new race of geese.

In Honolulu it is said there are 20,000 people from the mainland who "missed the boat," because they were overwhelmed by the attractiveness of this farthest west part of the United States. The migratory instincts of these old gray geese may have been overcome by their liking for their new home.

At any rate, they adapted themselves to the new conditions and the new food supply. Later they seem to have moved up into the mountain country—perhaps as a result of depredations by man, who by that time also had migrated hither. In time, isolated as they were, they developed into a new species.

They were hunted by the Hawaiians, whose weapons in the old days, however, could do no such execution as modern firearms. Some were caught and domesticated, and it is said Hawaiians used to keep them about their houses, to give warning (in the manner of another flock of geese at the other side of the world in the long ago that once saved Rome) of the approach of strangers. Instinctively they respond to conditions of domestication. They are given to following their masters on long journeys when they go afoot. They show little fear and seem to have a weakness for posing for pictures.

Besides the government flock at Mokapu, there are the two other groups from which these geese came—one at Herbert Shipman's ranch at Keaau, on the southeast coast of the island of Hawaii; and one at the Hind ranch at Puuwaawaa, a dry upland, about 2750 feet above the sea. They seem to do equally well in the ponds and marshes, or on the comparatively waterless higher land. But at both places the modern nene must combat the menace of the introduced rat and the mongoose.

A wild male Canada goose joined the Shipman flock a few years ago, probably through some misadventure of migration similar to that which resulted in founding the original colony, living out his life harmoniously with the nene—perhaps his distant relatives—bringing together lines that had diverged from a common stem many centuries before.

As the Hawaiian geese at Mokapu multiply, the commission plans to liberate them on the various islands to replenish the game supply—always keeping a sufficient number under protection at the farm to insure this rare American species of goose from dying out. Only by such vigilance can the perpetuation of a beset race be assured.

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Archibald Rutledge returns to the February issue of Nature Magazine with another of his delightful wildlife stories. Dr. Julian Corrington gives us another fascinating peek through his microscope, and Adolph Kruhm introduces us to some of the vagaries of seeds. Hiram Jefferson Herbert, a "comer" in the Nature writing field, makes his bow in our pages with an entertaining story of the ant lion.

OKLAHOMA CACTUSES

By MARION SHERWOOD LAHMAN

Photographs by James Slack

ALTHOUGH Oklahoma is not usually considered a cactus state, it has a fairly numerous population of these peculiar plants. Furthermore, it boasts of several species that are native only within its borders.

Tilted like a six hundred mile roof, the land surface of the state rises from a five hundred foot elevation in the southeast to five thousand feet in the northwest. The change in elevation is accompanied by differences in soil, rainfall and plant life; all of which explains why the cactuses found in the eastern part are different from those in the western part. Eastward, on the limestone prairies and rocky hillsides that intersperse forests and fertile river-bottoms, are found several kinds of prickly pear, *Opuntia,* and the Missouri pincushion cactus, *Neobesseya missouriensis.* These are not confined to Oklahoma, being no respecters of man-made boundary lines. The factors that do limit their distribution are of Nature's making—soil, climate and rainfall.

The Missouri pincushion cactus is found from South Dakota to Texas, on that north and south strip of plains that lies between the Mississippi Valley country and the Rocky Mountain region. The plants are seldom more than two inches high and snuggle among bits of surface rock where they are hidden by lush prairie verdure. The silky, pale-yellow flowers are followed by red berries that persist for a year if not eaten by birds or mammals. A similar pincushion cactus, *N. similis,* has flowers of a peculiar rosy-bronze, fading to yellowish. It ranges no farther north than Kansas.

THREE CACTUSES OF OKLAHOMA

The flowering plant is Bailey's hedgehog cactus. At the left the leafy, growing shoots of a young cane cactus. The others are young plants of the tasajilla

The inaptly named western prickly pear, *Opuntia humifusa,* is the most eastern of our cactuses. It grows from Minnesota to Kentucky and eastern Oklahoma. It is a variable species, which, by its different forms, has caused confusion even to expert botanists. That is a trick of many opuntias and explains why the two hundred and fifty known species have at least nine hundred names.

Two others, the many-spined cactus, *O. polyacantha,* and the brittle cactus, *O. fragilis,* are found locally throughout the northern half of the state. They cannot be called prickly pears because their seed-cases are dry and not edible.

Cultivation changes some cactuses. The big-root prickly pear, *O. macrorhiza,* is particularly susceptible. On its native limestone prairies, where it is likely to be trampled by grazing animals and where it endures the drying, southwest winds, it grows spines and is limited in its growth. In the Tulsa experiment garden's rich earth, it covered a yard square with well-fleshed stems and produced more than one hundred flowers, but not a single spine. In a given time, a joint will produce a much larger plant than a seedling. A four-

A COMMON CACTUS

Coryphantha vivipara **is frequent in southwestern Oklahoma but has no common name. Its flowers are delicate purplish-pink with silvery outer segments.**

ONE OF THE RARER CACTUSES

It is so seldom found that it had not before been photographed. It is *Echinocereus albispinus.* Note the delicate pink flower that grows from the base

year-old seed plant was not one-tenth as large as this one described and did not bloom. Seedlings had seed leaves something like those of a squash. Most cactuses have dispensed with leaves in their efforts to conserve moisture. Opuntias do have little fleshy tabs on the growing tips, but these soon fall off. Yet even opuntia needs seed-leaves to feed the baby plant until it is able to feed itself. The first joint of each of the big-root seedlings was cylindrical.

Do you see what that means? There are two groups of opuntias: first, plants with cylindrical joints; second, plants with broad, flat joints. The seedlings of both start with a cylindrical joint. Embryology teaches that higher forms of life pass through lower form stages. So, these seedlings show that flat-jointed cactuses are higher forms than the cylindrical-jointed ones. That is, an ordinary prickly pear is higher up in the plant world than a cane cactus.

In western Oklahoma, there are three kinds of cylindric opuntias: the cane cactus, *Opuntia imbricata,* the tasajilla, *O. leptocaulis,* and *O. davisii.* The cane cactus is a conspicuous object on the mesas of New Mexico, and reaches its eastern limit in western Oklahoma. But ours are only from three to five feet high, while many New Mexico plants grow to twenty-five feet. It is called cane cactus because souvenir canes are made from the woody, reticulated skeletons of the branches. Its stout, sheathed spines are formidable weapons repelling man and beast, birds excepted. I shall always remember a mocking-bird's nest with three fledglings in one of these spiny havens. How the mother bird did fight me! The rose-colored flowers bloom from May to July according to altitude, earlier on the mesas than on the mountains. Yellow flowers are frequently reported, but this is an error probably caused by the yellow seed cases, which, from a passing car, might look like flowers.

The tasajilla, a stiff, upright bush, three to five feet high, is found in west Texas, southwestern Oklahoma and New Mexico. It has three ways of propagating. The young shoots, growing at right angles to the branch, fall off at the slightest touch. They promptly take root, no matter in what position they lie, and form new plants. Seedlings are not so successful. Sprouted by spring rains, they are likely to die in summer droughts. A third method of propagation is by the sprouting of a new plant from the fruit while still attached to the plant. The scarlet berries persist, and may be seen on the same branch with the yellow flowers of the following season's blooming.

OKLAHOMA HEDGEHOG CACTUS

A native son with large flowers and the most profuse bloomer of the group to which it belongs

Of the *O. davisii* (it has no good common name), I must issue a warning. It is the most formidable of any cactus within the Oklahoma border. Fortunately for us, its wider range is in west Texas and eastern New Mexico. It is on the order of the

THREE MAY-BLOOMING CACTUSES SHOWN ALMOST NATURAL SIZE

At the upper left is the Missouri pin-cushion cactus, with the green cereus in front of it bearing its seven apple-green flowers. At the right the purple cactus

cane cactus but much smaller; spreading, one or two feet high, a low tangle of spiny branches. The flower is yellow. The plant is thickly set with stout, hooked spines, each encased in a papery sheath. At the slightest touch, the hooks catch so firmly in flesh or clothes that it requires a strong jerk to break loose. The jerk brings away the joint, which is exactly what the plant wishes. For, opuntia-fashion, the fallen joint takes root from the surface nearest the ground, forming a new plant.

There are several species of flat-jointed opuntias in western Oklahoma, among them the Comanche cactus, *O. camanchica;* the twisted-spined cactus, *O. tortispina;* the many-spined cactus, *O. polyacantha,* and the hairy cactus, *O. trichophora.* The latter has a heavy covering of long, white, hair-like spines. Its lemon-yellow flowers produce parchment-like, vase-shaped seed cases packed with flat, bony seeds. The range of the hairy cactus is given as central New Mexico, but it is plentiful in the extreme northwest corner of Oklahoma.

In that same region of scenic rock formations are found the green cereus, *Echinocereus viridiflorus,* and the purple cactus, *Coryphantha radiosa.* The former decided to be different, so its flowers are apple-green and the spines on the growing tip are ruby-red, the reverse of the usual coloring. This little green cereus is the smallest cactus we have. A three-year-old plant is the shape and size of a thimble. An old, extra large plant may be two inches high. A taller variety is found in New Mexico.

The purple cactus belongs in a group of variations that make it difficult to decide which is a species and which is only a variety. One of my plants bloomed on May-day and set fruit that ripened into an oblong, green berry in the fall. In bright sunlight, the flower opens into a flat, many-pointed star that is not purple, but bright magenta, that is, bright red with a tinge of purple. The early botanists, being mere men, did not distinguish colors very well.

Another species in this group, the New Mexico cactus, *Coryphantha neomexicana,* is more southern in its range. It grows in southwestern Oklahoma along with the pink pincushion cactus, *C. vivipara* and *C. columnaris.* In spring, it is crowned by numerous magenta flowers that do not open flat.

Coryphantha columnaris is a newly named species, found so far only in southwestern Oklahoma. It had two magenta flowers when it was brought nearly three hundred miles northward to the Tulsa garden but these withered before a picture could be made. For three years it did nothing. In July of the fourth year it budded, and was ready to bloom the day I was leaving for New Mexico. In desperation, I took it with me; and it blossomed that afternoon in the Pullman. According to habit, the flowers closed at sundown. The third afternoon, for the last time, it opened at seven thousand feet. Here it spent a couple of months and then made the return trip to the seven hundred foot altitude of Tulsa. Replanted in the garden, it seemed none the worse for its travels. And I had a water-color picture of the flower! The troubles of the photographer began two years later when he tried to get a picture. You never saw such a temperamental thing. The flowers would not open before two P. M. and then only in sunlight. Rainy weather interfered with picture taking until the last day. The flowers opened slowly and the photographer prepared to take a shot.

Spatter! A little cloud skittered across the sun, a few drops fell and the flowers began to close. When they opened an hour later, the shadow of the house dulled the light. It was a case of now or waiting another year. The photographer rushed into the house, brought out a large mirror with which he focussed sunlight upon the cactus and so took the picture shown here.

THIS HAS NO COMMON NAME
It is *Coryphantha columnaris* and is distinguished by its characteristic narrow base

Another cactus peculiar to southwestern Oklahoma is Bailey's hedgehog cactus, *Echinocereus baileyi.* Its wide-mouthed, trumpet-shaped flower is three inches broad and the silken petals are a rich magenta-purple. Vernon Bailey of the U. S. Biological Survey took some plants to Washington where the eminent botanist, Dr. Rose, named the new species for him.

Naming a plant for a man does not always result so euphoniously. Is not *Echinocereus reichenbachii* an appalling list of syllables to fasten upon a hapless wild flower? Its common name is hedgehog cactus and it is the best known of a group comprising itself, *E. baileyi, E. oklahomensis, E. albispinus* and *E. purpureus* with several variations, all peculiar to Oklahoma except the first, which has stepped over the border into Texas and Kansas. They are attractive cactuses with large, handsome flowers.

Handsomest of all is the new *Echinocereus oklahomensis,* named for the state in which it was discovered. It has a stouter stem than any other of this group and the bright magenta flowers open wide, three and a half to four inches broad. *Echinocereus albispinus,* as its name suggests, has long white spines. The flower is a delicate, purplish pink. It never had its picture taken before, so little is it known.

Echinocereus purpureus is another newly-named species. It has short, purple-tipped spines, giving the stem an up-and-down striped effect. The flower is like that of *E. baileyi* but darker purple; while the spines are more like those of *E. reichenbachii.*

In between these named species are several variations, grading from one species to the next. They are interesting to a botanist at least, because they show how new species are formed. And all these forms are found in southwestern Oklahoma.

Recently, two cactuses, the Devil's pincushion or horse crippler, *Homalocephala texensis,* and the pancake cactus, *Neomammillaria heyderi,* have been found in the southwestern corner of our state, although they were not supposed to extend so far east. They bring the list of cactuses known to be native in Oklahoma to thirty-two. But there is a prospect of more to be identified, so unexplored has been this field.

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ROTOGRAVURE SEPARATES

We have received a number of inquiries from teachers and others asking whether extra copies of our Rotogravure Section could be obtained separate from the magazine. Most of these teachers wanted the extras for mounting, posting, scrapbook, or other class projects.

Owing to certain mechanical considerations in connection with printing the magazine, we have on hand some extras of the Rotogravure Sections from October, 1934, to September, 1935, inclusive. These are untrimmed and admirable for the above-mentioned purposes. The task of collating these, and the cost of mailing them, have made us hesitate about announcing their availability. However, there appears to be a definite demand and use for them.

Therefore we are making available complete, unbound and untrimmed sets of the first twelve months (192 pages of Nature pictures) of the Rotogravure Section at one dollar a set, or the first or last six months (Oct., 1934, to Feb., 1935, or March, 1935, to Sept., 1935) at fifty cents a set. Extras of one particular month are available at ten cents each as long as they last and ***provided at least ten extras from any one month are ordered at one time.*** In the event that one or two months of 1934-1935 become exhausted it may be necessary to substitute separates of October and November of 1935 to complete the twelve issues.

MANY KINDS OF MIRAGE

By CHARLES FITZHUGH TALMAN

MIRAGE IN THE POLAR SEAS

An example of "superior" mirage seen by the members of the "Germania" expedition of 1869

ONCE the word "mirage" was applied exclusively to the delusive appearance of water seen, in deserts and elsewhere, over dry ground strongly heated by the sun. Nowadays the term is generally understood to include all the various manifestations caused by the abnormal refraction of light by the atmosphere.

Normally the atmosphere, on account of its somewhat regular decrease in density upward, bends light rays in such a way as to cause all objects near the horizon to appear slightly elevated above their true positions, and objects are thus brought into view that, if there were no atmosphere, would be slightly below the horizon. The rising of the sun and the other heavenly bodies is a little advanced and their setting is a little retarded by this process. The effects of normal refraction are not usually classed as mirage.

Abnormal refraction depends upon unusual variations of density in the lower levels of the atmosphere, which, in turn, are caused almost entirely by special conditions of temperature. I say "almost," because wind and water vapor sometimes play minor rôles in the process, and because explosion waves sometimes produce a spectacular variety of mirage known as "flashing arcs." The latter have occasionally been seen to attend violent outbreaks of volcanoes, and they attracted much attention during the World War, when, at times, luminous concentric circles were seen to sweep over the sky at each discharge of heavy artillery.

THE SHIP OF THE FLYING DUTCHMAN

A picture from an old German book. The fable of this ship is probably based on mirage

The physical facts concerned in producing mirage make a long story, which is set forth in many textbooks; most fully, for students who read only English, in Dr. W. J. Humphreys' *Physics of the Air*. The classification of mirage depends, however, upon features obvious to the non-scientific observer, and hence the different kinds can be described without going into scientific details.

The variety known as "inferior" or "desert" mirage spreads phantom lakes and pools over hot plains and deserts. It is likewise seen over roadways; especially those with smooth and hard pavements. Mirage of this sort is, in fact, so common over streets and highways in hot sunny weather that one wonders why reports of its occurrence published occasionally in the newspapers generally imply that it is something rare and mysterious.

"Lateral" mirage is the kind that causes objects to appear displaced sideways. It is seen when you look closely along the vertical face of a sun-heated cliff or wall and it is usually not impressive. The "looming," "towering," "sinking" and "stooping" of distant objects are common mirage phenomena, with which sailors are especially familiar. Objects are said to "loom" when they appear to be raised above their natural elevations, so that, for example, a mountain usually below the horizon is seen above it. Things "tower" when they appear to be drawn out to abnormal length vertically. "Sinking" is the opposite of looming, and "stooping" of towering.

Among the rarer and more startling sights in the mirage gallery are the single or multiple "superior" mirages, in which erect or inverted images of objects are seen suspended above the horizon. This kind of mirage is commonest over water, where it occasionally treats the spectator to the sight of a ship, actually beyond the bulge of the earth, apparently sailing along the sky. The image is usually clear and steady, so that details can be made out with a telescope.

Superior mirage is prob-

PHOTOGRAPH FROM DEATH VALLEY HOTEL COMPANY

THE WATERS OF ILLUSION IN DEATH VALLEY

This is a fine example of desert mirage, a sight that is by no means rare and in a measure is frequently duplicated in hot weather on the pavements of our highways

ably responsible for the story of the Flying Dutchman and other legends of the sea, while the unembroidered records of its occurrence read like fairy tales. Mirage surely never staged a more dramatic performance than it did in January, 1913, off the shore of McMurdo Sound, in the Antarctic, where the surviving members of Captain Scott's expedition were anxiously awaiting the return of their ship, the *Terra Nova,* which was to take them back to civilization.

"About noon on the 17th," wrote the late H. G. Ponting, the expedition's photographer, "I was sweeping the north with the glass, when suddenly the masts of a ship came into the field of view. For a moment I could scarcely believe my eyes; but there could be no doubt about it. They were the masts of a barque; but presenting an extraordinary appearance, for they towered unnaturally high above the sky-line. Then I saw that what I was looking at was but a mirage. The real ship was hull-down below the horizon, and only the masts were visible. Above them a wonderful mirage of the entire vessel, hull and all, appeared inverted; and over this first reflection there was a second image of the ship, upright. It was the upper image that I had seen first. * * * It was a remarkable illusion, but the *Terra Nova* was undoubtedly there—about thirty miles away."

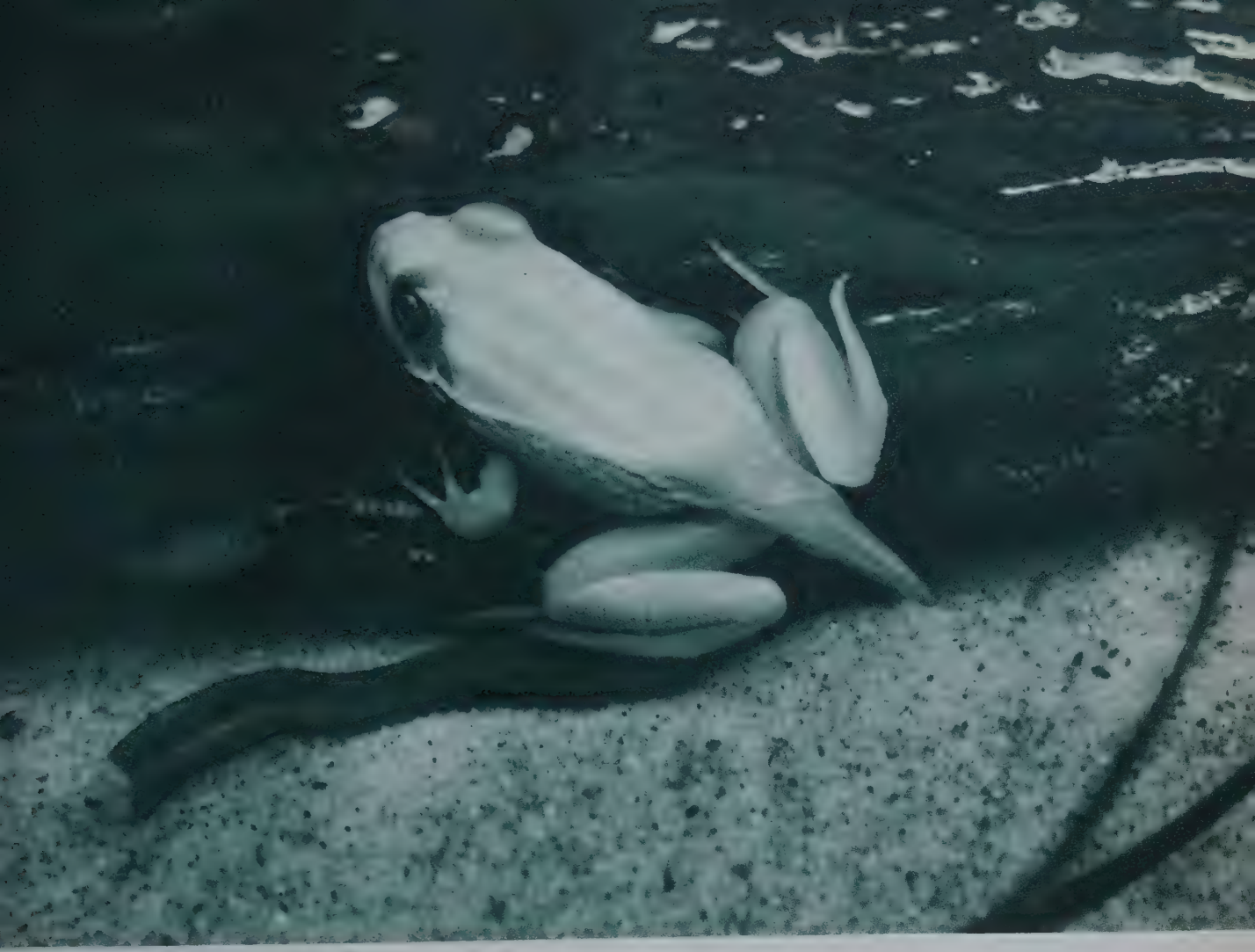
Occasionally inferior and superior mirage are seen at the same time. In a case of this kind recently reported in England a motorist saw, on a dry road, an approaching car apparently half submerged in water, while its inverted image appeared just above it.

Another common trick of mirage is to distort the outlines of faraway objects; giving the effect that you observe when you look at something out-of-doors through a "bubbly" windowpane. Thus the sun and moon sometimes assume a variety of queer shapes when near the horizon, or a distant ship undergoes equally weird transformations. When an extensive area of landscape or seascape is involved in such distortions, the whole display is called "fata morgana." This phenomenon, contrary to a statement found in many books, is *rarely seen* along the Straits of Messina, where it acquired its name—Fata Morgana being the Italian equivalent of Morgan le Fay, of the Arthurian legends. It is commonest among the ice fields of polar seas and graphic descriptions of it are given in many narratives of polar exploration. The classic account is that published, with drawings, in 1820 by William Scoresby, Jr., who wrote of a display along the coast of Greenland:

"The general telescopic appearance of the coast was that of an extensive ancient city, abounding with the ruins of castles, obelisks, churches and monuments, with other large and conspicuous buildings. Some of the hills seemed to be surmounted by turrets, battlements, spires and pinnacles; while others, subjected to one or two reflections, exhibited large masses of rock, apparently suspended in the air, at a considerable elevation above the actual termination of the mountains to which they referred. The whole exhibition was a grand and interesting phantasmagoria. Scarcely was any particular portion sketched before it changed its appearance and assumed the form of an object totally different. It was perhaps alternately a castle, a cathedral or an obelisk; then, expanding horizontally and coalescing with the adjoining hills, it united the intermediate valleys, though some miles in width, by a bridge of a single arch, of the most magnificent appearance and extent."

A VARIED COLLECTION OF SEA SHELLS, ALL OF THEM GATHERED FROM SHELL ISLAND NEAR ST. PETERSBURG, FLORIDA. PHOTOGRAPH BY SIGFRID LARSON

THE BISHOP CAP MUSHROOM, A NATIVE OF MEXICO, PHOTOGRAPHED BY WRIGHT M. PIERCE



One in a Million

By EDWARD R. OSTERNDORFF

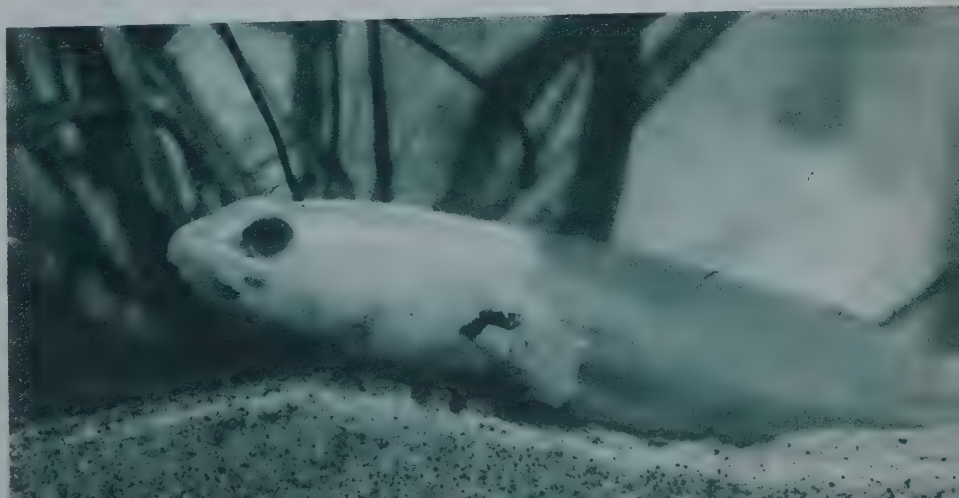
New York Zoological Society. Photographs by the Author

This albino frog is one of the rarest inhabitants of the New York Zoological Park. During the last thirty-five years only two albino pond frogs, *Rana calamitans,* have been on exhibition at the Park.

Millions of tadpoles are hatched each year, but comparatively few of them reach maturity. The struggle for existence is too great and their natural enemies are so numerous. Tadpoles are preyed upon by birds, fish, and water insects. Probably one in a thousand lives to become a fully developed pond frog. This species of frog must live through part of two seasons before becoming adult. The actual change from tadpole to frog takes place quickly. First the hind legs appear and, in a few days, the front ones emerge. The tail then begins to shrink until it is completely absorbed.

Of a million tadpoles, it is safe to say that less than one hundred are albinos. Because it is so conspicuous, an albino tadpole has a much slimmer chance of reaching maturity than a "regular" tadpole. An albino frog is a great rarity—really one in a million.

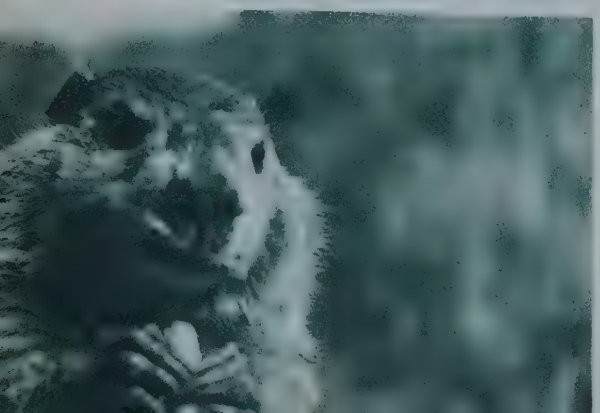
One of the accompanying photographs of the albino pond frog was made during the stage when the tail was being absorbed. Five days later the tail disappeared and the one-in-a-million pond frog reached maturity.



Just as our own mountain goats live on the crags and precipices of the Rockies, so do their distant relatives seek the dizzy heights of the Alps. Photographer R. Schudel has obtained a close view of some of the sure-footed Alpine ibexes in the mountains of Switzerland. This region also boasts a population of the famous chamois, elusive and high-roving beasts, here seen making their way across the snow of a high Alpine pass. Life in these high places is not confined to four-footed folk, as we see from the eagle's nest that W. Schweizer, at no small risk of life and limb, has photographed high in the mountainous Kiental peaks of Switzerland.

Instead of bringing straw for their nests, these sparrows brought their nests to the straw. They burrowed into the side of the huge strawstack in this barnyard and laid their eggs in hollowed-out passages. More than 100 sparrows and several starlings used the stack as an immense bird apartment house. From the road, passing the farm, the stack looks like a sandbank in which scores of swallows have made their nests. Photograph by Edwin Way Teale.

There are few more graceful birds than the gull, either in the air or when alighting or preparing to take off. Here Sigfrid Larson has caught the true grace of the bird.



Pal, a Wily and Wise Woodchuck

By C. HUBER WATSON

Photographs by the Author

Pal is a woodchuck, thrown by fate into human companionship and proving what friendship will bring out in one whose destiny had been the precarious life of the wild. Since Pal's entrance into the world of humans came at a tender age, she was first introduced to the old and reliable bottle and nipple. She persisted in embarrassing her foster parents by a continued affection for the bottle, an affection that continued even after she had grown large enough to have solid foods and the proper supply of vitamins in her diet. She was indulged in this, but there were often more pressing and important things to be done than holding the bottle for a woodchuck that continued in baby ways. So the bottle was hung from a line and Pal would help herself handily whenever she felt the urge.

Pal found a new use for the comic sheet of the Sunday newspaper. In fact, she carried it down into her burrow with her. We doubted, however, that this was to provide her with amusement during the long months of her hibernation. In truth, we knew that she was taking the paper to add to the nest lining of dried grass and leaves already taken below ground.

Balanced diet, with the proper proportion of greens, is recommended for us humans, and Pal had hers also. She liked to sit on her haunches and munch away at a wholesome meal of dandelion greens. She equally enjoyed a raw carrot, and both of these dietary items aided in building her fur coat into a satisfactory slumber robe for her winter's sleep, and in adding avoirdupois for that same long hibernation.

Pal seemed perpetually at peace with all her neighbors around the farmyard. So even was her temper, in fact, that she did not object to sharing her slice of bread with the ever-hungry golden pheasants. She seemed never to doubt where the next meal was coming from, and with reason, for she was probably a quite spoiled woodchuck.

Pal was not particularly enthusiastic about "dressing up". She felt that there was something foolish and unnecessary about it; that it was decidedly unwoodchucklike. However, bribed with a slice of bread or a cookie, Pal would stand for a certain amount of ornamentation, that is, as long as the bribe lasted.

Young, but Not Beautiful

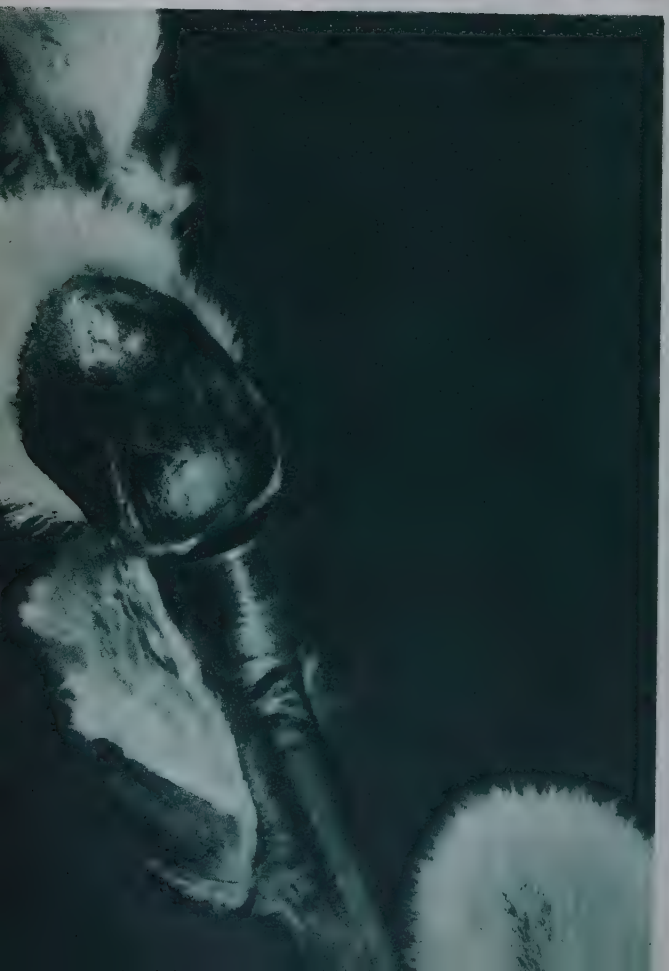
Photographed by Wright M. Pierce

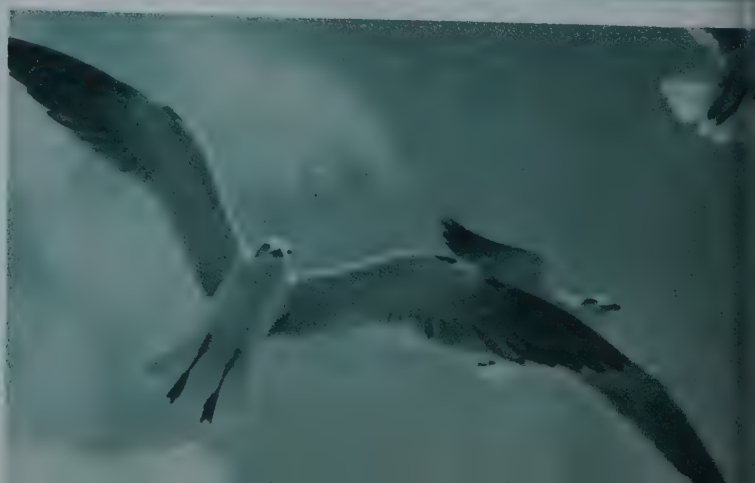
Five studies in bird youth. The three young duck hawks, while they have a sort of wise look about them, spent the time while being photographed in telling the photographer precisely what they thought of him. The young barn owl, however, was too young and too well fed to care much. Much brighter looking babies are the young golden eagle at the upper left on the facing page, and the young western red-tailed hawk whose mouth was wide open in raucous protest at the moment when the shutter clicked. A most precocious baby is the young black-necked stilt, a veritable bird daddy long legs as it tries to escape from the persistent photographer by dashing about in the weeds.

Smoke clouds hover over the summit of Mauna Loa, whose active volcanic crater erupts every few years and sends rivers of lava down to the sea. This volcano is at the southern end of the chain of mountains of the Hawaiian Islands. The lava flows from this crater often result in strange formations. The theory in the case of this "Rock of Ages" is that it represents a nucleus of hard material which was surrounded by softer cindery stuff that was soon worn away and disappeared.

With the exception of 23 human beings concerned with a cable station, Midway Island, farthest west point of the Hawaiian Islands, has supported mainly a population of birds. Now with a trans-Pacific air route more than a mere theory, this bird life is destined to be seen by more and more visitors, themselves arriving in a large and noisy bird.

A bewildered baby gooney poses for a camera wielded by a United States Coast Guardsman. Perhaps the bird is trying to figure out what all this excitement is and what these peculiar people are doing invading his habitat on isolated Palmyra Island. Photographs courtesy of the Pan-Pacific Press Bureau.



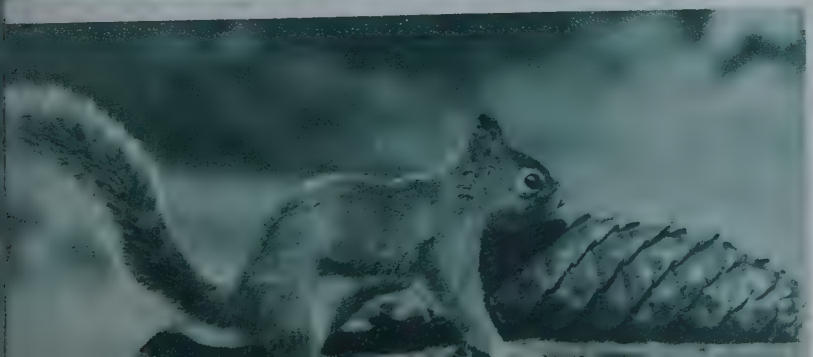


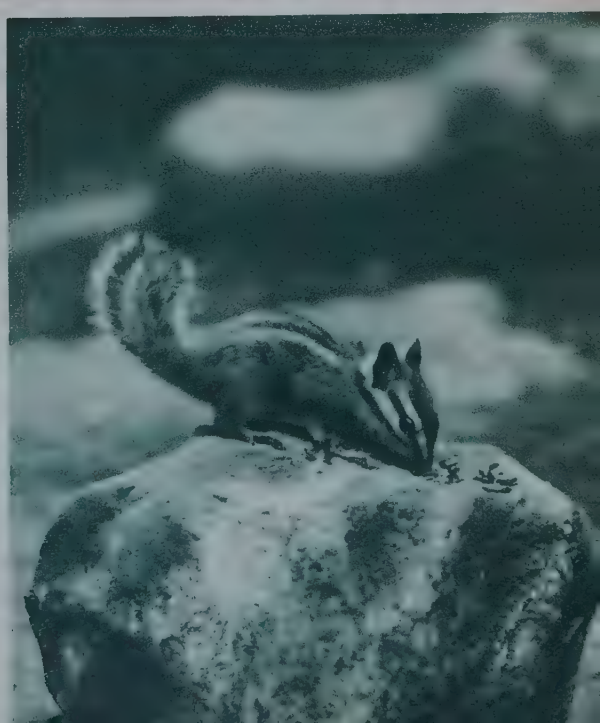
The Nature Picture of the Month

Pictures of the weasel are not frequent; those of this mammal in winter coat of white less frequent; and one of a weasel in winter coat in a tree a rarity. Robert F. Flint of Grove City, Pa., is, therefore, given the special award this month. This picture was taken by Mr. Flint with a Kodak when on a hike near Bismarck, North Dakota.

Also on this page are outstanding pictures, the one of the gray squirrel in characteristic pose by H. Alfred Wires of Williston Park, New York; the one of the Douglas squirrel guarding its cone by Edgar C. Smith of Fresno, California; and the gila chipmunk at lunch is the work of Harry L. and Ruth Crockett of Phoenix, Arizona.

Other outstanding pictures are reproduced on the opposite page. In the picture of the Indian pipes Colin S. Farmer of Toronto, Canada, has attained remarkable detail of texture; G. Harper Hall of Montreal has caught a gannet preparing to end its flight; Maude Heaton of Cooperstown, N. Y., has snapped a shell parrakeet in a quiet moment; George M. Coates of Upper Montclair, N. J., has photographed the grace of the gull in flight, and William H. Bard of Mount Vernon, N. Y., shows the interesting details of a pussy-willow branch.





THIS INTERESTING PHOTOGRAPH OF SQUIRREL CORN IN HABITAT WAS TAKEN BY JOHN VOSS OF PEORIA, ILLINOIS, AND GIVEN AWARD BY THE ROTOGRAVURE EDITOR

★ Conservation ★

A section of Nature Magazine devoted each month to the expression of practical opinions on the vital issues affecting our use and abuse of natural resources, including wildlife, and dedicated to the purpose of assisting Americans to play a militant part in the attainment of constructive conservation aims.

ARTHUR NEWTON PACK, *Editor*

MR. DARLING RESIGNS ★

The resignation of Jay N. Darling from the post of Chief of the United States Bureau of Biological Survey was not unexpected. It had become increasingly evident from public and private utterance that he was thoroughly disgusted. While hunting for some answer to the problem of wildlife preservation and restoration he had run up so many dead-end streets that he had apparently concluded there was no through street. So he decided to return to wielding his powerful cartoonist's pencil.

While we did not find ourselves in agreement with all of Mr. Darling's ideas or methods, we are sorry to see him go. He was a dynamic and eloquent Chief. He could "take it" as long as he felt there was hope. But he found bureaucracy too irritating; red tape too entangling. He will continue to be a figure in the wildlife conservation field; perhaps an even greater figure on the outside than he found he could be on the inside. We have missed his spirited cartoons ridiculing the pretensions to sportsmanship of the hardened killers and their shallow excuses for game scarcity. We shall not forget his valiant championship of the waterfowl as a member of the Advisory Board. May we hope for a revival of these products of his sense and genius.

In resigning, Mr. Darling made this statement:

"I have come to realize that most of our wildlife conservation troubles are due to lack of organization among those who are interested but ineffective in the conservation of wildlife. There is no mass strength to enforce adequate legislation and executive attention to wildlife interests. Every other element of American life has a national organization to get effective results. Wildlife interests remind me of an unorganized army, beaten in every battle, zealous and brave but unable to combat the trained legions who are organized to get what they want."

There is great truth in this statement. The money interest involved on the side of those who want wildlife so that they may kill it has resulted in the organization of this minority "to get what they want." They have built up a fiction that they own the wildlife and they defend that fancy with ample funds and power. It has ever been the fate of unorganized majorities to see things in which they have a vital stake snatched from under their noses. And the sad part is that there is a far greater, though less tangible, economic value in the preservation of wildlife than there is in the means to its destruction.

If the makers of cameras, the owners of railroads and the manufacturers of automobiles that carry people to recreation areas deriving much of their allure from the existence of wildlife, or the producers of innumerable items of use to those who seek the outdoors would realize the value at stake things might be different. They might see the wisdom of protecting wildlife and providing the means to combat the money power of the arms and ammunition makers who seek to keep the killing going. There are more people fundamentally interested in perpetuation and increase of our renewable natural resources in wildlife than there are those seeking to destroy these resources. But Mr. Darling is right; they are unorganized.

What do we have today? We have such national groups as the National Association of Audubon Societies, the American Nature Association, Dr. Hornaday's Permanent Wild Life Protection Funds and Mrs. Edge's Emergency Conservation Committee. We have many active but scattered state and local organizations. We have conservation sections within the General Federation of Women's Clubs, the Daughters of the American Revolution and the Garden Clubs. All of these groups, working together on a definite program, would get what they want. But where are the funds to provide them with the weapons of information and political power so essential in a democracy? Yes, Mr. Darling is right. It is no news to us. We have been urging the organization of *real* conservationists for a long time. But we haven't found the answer yet any more than has Mr. Darling.

THE NEW CHIEF ★

Ira N. Gabrielson has been appointed Chief of the United States Bureau of Biological Survey to succeed Jay N. Darling. With a record of twenty years service in the Bureau, the new Chief is acquainted with its problems and activities from coast to coast. He has served in about every branch of the Bureau's work. He has a wide scientific as well as administrative background. He will be confronted by the same difficulties that beset his predecessor. It is too much

to expect that Mr. Gabrielson will be able to solve them where Mr. Darling and others could not. We believe, however, that he will tackle the problems of his office with courage and without dismay, and we bespeak for him the support of friends of wildlife and wish him well. He is confronted with opportunity and heavy responsibility.

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NO HOLDS BARRED ★

It may appear that we have been over-zealous in devoting these editorial pages this month to the Biological Survey and to Mr. Darling. Nevertheless this Bureau and its late Chief are distinctly provocative of comment.

As Chief of the Bureau Mr. Darling frequently struck out at the sportsmen in quite definite terms. At the same time he appeared to feel that more could be accomplished for wildlife by cooperating with them than fighting them. For example, he publicly declared, both in 1934 and 1935, that if the best thing were done for the ducks there would be a closed season. Yet he did not fight for such a regulation, but acceded to the heinous season of 1934 and seemed satisfied with the compromise of 1935.

On the eve of his resignation, however, some of the scales seem to have been struck from his eyes. In the November 2 issue of the magazine *Today* Mr. Darling lashed out in no uncertain terms, and, we suspect, with no small degree of satisfaction.

"No major sport in the world (with the possible exception of the wrestling game)", he said, "has suffered so much from abuses within as the time-honored recreation of wild-fowling. The boys like it so well they've about ruined it. . . . .

"Speaking by and large, everything goes in the great conglomerate fraternity of those who take fish and game by fair means or foul. Nothing is barred. You may shoot out of season, exceed the bag limit, buy ducks of a bootlegger, bribe a game warden, have your Senator intercede with the judge and still be accepted in good sportsmen's society. If you can carry home one bag limit in the open, hide a gunny sack full under the seat cushions and stuff another dozen in your spare tires and get as far as the club ice-box with them, it's heigh-ho and a great joke on the Fish and Game Department. You can tag one possession limit for yourself, another for each one of your business associates and one for the village dog-catcher—just so they are out of your possession—and still call yourself a sportsman. Ducks by the thousands—trapped, shot on the water at night, shipped in eel kegs to hotels, commission houses and night clubs—are bought by the gentry of the sportsman's world with no resulting stigma. Baited slaughter pens with a guaranteed bag limit to all comers for $25 and a photograph of yourself with Charley, the guide (who shot them), go unchallenged in respectable circles."

This is plain speaking from a man who knows and to whom the gunners can scarcely refer with their usual sneer: "Bah! Sentimentalist." Mr. Darling further points out that there appears to be no penalty for hitting below the belt or fouling "in the realm of those who hunt and fish and call it sport". Everyone will agree with Mr. Darling when he says that "there are, of course, fine sportsmen." But, he adds, they "give a good name to many a racketeer whose abuses of the sport are responsible for the restrictions visited upon all alike."

Mr. Darling even cites one of our leading wealthy sportsmen who, finding the duck-shooting regulations onerous, finances a duck census to prove that those who contend there is a duck shortage are fools, and seeks "to organize a revolution against all those who stand in the way of the inalienable right of every American to shoot when and how he pleases." And, at that, we have a feeling that Mr. Darling has left a lot unsaid.

Perhaps, after this splendid salvo, it is just as well that Mr. Darling resigned. Otherwise there would have been a lot of conferring between duck-shooting constituents of those who sit in high places and a battalion of political tanks wheeled up to blast Mr. Darling right out. In any event, the fifth paragraph of this editorial is a splendid epilogue. Read it over again.

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KINGFISHERS AND GREAT BLUE HERONS ★ ★

Commenting on propaganda that is being circulated widely to encourage the killing of kingfishers and herons about fish ponds, a Nature-loving correspondent in Pennsylvania, member of a large club devoted to hunting and fishing, expresses sentiments that might well be heeded by others. There has been much vicious fiction circulated. Our correspondent says in part:

"These birds (kingfishers and great blue herons) are an asset to a trout stream rather than a detriment because all our streams are filled with fish *** that destroy the spawn of trout and eat the food that would maintain trout. *** We got a carp that weighed fourteen pounds and a fish this size would do more harm than all the kingfishers in Christendom. *** The Biological Survey makes the statement that under natural conditions the blue heron and the kingfisher are beneficial to trout streams. *** We have enclosed our ponds in such a way that these birds cannot get at the small trout and we find it much cheaper than employing a man at four or five dollars a day to shoot these beautiful, interesting birds. *** They are fast disappearing in Pennsylvania. I have seen only one blue heron and two kingfishers in the past three years, and I have made a study of them for the past fifty years."

WHOSE WILDLIFE?

By DONALD HOUGH

ONE DAY I was shooting ducks out in Jackson's Hole, Wyoming. I was on top of a butte, in a field of shocked oats, to which the ducks came for food. I was sitting there in a blind, waiting for some ducks, when I saw a flock of about a dozen mallards coming almost directly toward me. As they came closer I noticed that they were flying much faster than any other ducks I had seen during the day. They approached me at a terrific speed, and I got my gun ready.

But as I was about to stand up and fire, I caught sight of a hawk at the rear of the flock. I lowered my gun, and watched. As the flock passed me, the hawk caught up to the hindmost duck, struck it like lightning; there was a puff of feathers in the air and the duck tumbled down the side of the butte. With the same movement in which he struck, the hawk zoomed straight up, perhaps a hundred feet, poised, then came down like a plummet on the prostrate mallard, finishing the job.

When I related this to some other hunters later, they criticised me for failing to shoot the hawk. But I had not felt the least inclination to shoot the hawk. I had witnessed one of the most unusual spectacles that I ever had seen in the outdoors during all my experience as a hunter: a duck caught by a hawk in stern chase. The hawk had outflown the ducks. It was easily the high point of the day for me, and one of the most memorable sights, involving wild life, I ever had seen. It was Nature in motion, in action—vividly so. I would rather have seen it than to have shot a dozen ducks.

If I had been an advocate of vermin control, as it is called, I would have tried to shoot the hawk. Vermin is the name given by many sportsmen to all wildlife not classed as game, save only song birds, insects and minor rodents. The warfare waged by sportsmen on this so-called vermin constitutes an interesting study in acute self-righteousness. If fully successful it would eliminate entirely from our fields and forests all crows, many of the hawks, the owls, all of the red squirrels, blue jays, foxes, wolves, large turtles, carp and other non-game fish, coyotes, mountain lions, wild cats and other members of the cat family, and even the bitterns, herons, cranes and other large waders, as well as stray house cats, which are not any part of our wild life and are consequently not under discussion.

In many parts of America hunts for vermin are conducted on an organized basis by the sportsmen's societies, clubs, and so forth. Urged on, coached and given every assistance by the manufacturers of arms and ammunition and others interested materially in promoting shooting, these sportsmen annually kill many thousands of these wild birds and animals for the stated reason of eliminating dangers and perils that threaten the game birds, and the game fishes and animals.

PHOTOGRAPH BY WALTER HASTINGS

GREAT BLUE HERON
One of the birds persecuted by the "vermin" hunters on the ground that it destroys game fishes

A few years ago, while serving with the Izaak Walton League of America in the capacity of publicity director, I had ample opportunity to familiarize myself with the activities of sportsmen throughout the country. In addition to crow shoots, so universally conducted that they today constitute a major activity of organized sportsmen, I have known of many intensive campaigns waged against every one of the wild birds or animals listed above. The crows are killed partly because they are said to injure game birds, especially by eating the eggs thereof, but the reason most often advanced is that they are destructive to the crops of the farmer. Blue jays are supposed to be harmful to song birds and game birds. Red squirrels are indicted on the same basis, as are hawks, owls, and many large birds. Large turtles are accused of eating newly-hatched wild ducklings, carp of destroying the food of ducks and of making waters which they infest unfit for game fishes. Coyotes, mountain lions, and all of the larger animals of prey are held guilty of rather astonishing appetites for members of the deer family, and for domestic stock. The fact that great numbers of bitterns, blue herons, cranes, and even gulls are killed because of their depredations against the chosen of the sportsmen is almost impossible to believe. Yet the reason given is that these birds eat small fish.

I once met a party of sportsmen, in mid-summer, who, although on a fishing trip, carried shotguns. They were shooting every large wader they saw, because these beautiful creatures interfered with the fish supply by eating a few minnows. They had killed bitterns, blue herons, gulls, and, in fact, every sizable bird that came along. That these harmless waders are protected by law, and not recognized, in most states, as desperate villains, is beside the point.

I have been present at annual "vermin shoots" conducted by shooting societies in which bushel baskets filled with the carcasses of red squirrels, blue jays, harmless hawks as well as many hundreds of crows, were exhibited as evidence of the determination of the sportsmen to make the woods safe for the bob-whites. I was especially amused in one such instance. The shoot was conducted by the sportsmen of a city of nearly half a million people. They did their shooting in the city's environs—in the woodlands nearby, where thousands upon thousands of non-sportsmen citizens, young and old, find the opportunity for meeting Nature at first hand, and among whom the sight of a red squirrel, of a hawk, even of a company of crows, is tonic as valuable to them as the business of killing game birds is to the sportsman. On the other hand, the territory covered by this vermin hunt was inhabited by perhaps a few hundred game birds. Surely very few, if any, of the hunters made use of these nearby pastures once the shooting season was opened.

GROUND SQUIRREL
When predators, birds and mammals are killed off, small rodents increase and Nature's balance is disturbed

This enthusiasm on the part of the hunters to control the things they term "vermin", in which enthusiasm they are amply encouraged by various interested agencies, perhaps finds its basis in the desire to shoot. After all, the hunting season is short, and is growing shorter each year. Guns lie idle for many months. The itch to pull the trigger is one of the most persistent itches known to man. I have satisfied myself that it is this itch, rather than any vast extent of damages done to the more defenceless of our game, that has accounted for the death of untold thousands of birds and animals whose conviction often is based on slender, sometimes silly, evidence, and which creatures, even though convicted of the heinous crimes specified, still remain to be convicted, before the great numbers of people who enjoy the outdoors, of being worth more dead than alive.

Control of vermin, indulged in by the sportsmen on a more or less semi-professional basis, is a major activity of the conservation branch of American government. In this activity, it is the interest of the farmer, the stockman, rather than that of the sportsman, that is zealously guarded. It is concentrated in the West, and the offenders are mostly coyotes, wolves, lions and other big cats, and, upon occasion, bears. Here we have no pleasant shooting exercise, but an organized warfare, with poison as the base of operations. For years the merits of this activity have been the subject of sometimes rather heated controversy. One rancher claims that all coyotes and all the cats must be destroyed, but his neighbor declares that the destruction of the coyotes, up to date, has raised merry hob with the ranges. He points out that the coyotes, admittedly largely dependent upon small rodents for sustenance, and attacking game and domestic stock only on rare occasion, have always held in check, according to Nature's plan, the ground squirrels of the West. The ground squirrels have increased many fold as the coyotes have been driven back into the remote fastnesses of the mountains. The squirrels, he says, kill off the grass over certain spots throughout the range. The grass killed, and all that can grow there —and does—is a weed poisonous to cattle.

In the northern forests, the pine forests, national and state conservation agencies do everything possible to kill all the wolves. A favorite method is the use of poisoned meat, which is distributed through the forests. Once while I was travelling by dog team through one of these forests, the best dog we had with us, having developed a lame foot, was unhitched and allowed to run along out of harness. The dog lasted half a day. He got hold of some poisoned meat beside the trail and the strychnine fixed him in a few minutes.

I asked one old trapper about the effect of this poison campaign. He shook his head. "I'll tell you," he said, "if they keep up poisoning, these woods'll soon be bare. The Canada jays eat it and die. All meat eaters, not only the few wolves we have up here, eat it, too. A few years ago a fellow always had a lot of jays hanging around every time he made camp. You get to like the little devils. Now you can travel for two weeks and never see one of them."

The principal difference between a park and a forest is that, while the park is an imitation, devitalised and without a trace of virility, a forest has a definite vitality, a certain something that we might, by stretching a point or two, call a soul. This spark of life, this element which makes a countryside or a northern forest or a western plain a wild place, is constituted of the wild life that inhabits it, and much of this wild life is the predatory kind. It is the "vermin". The undesirable element is by far the most interesting. The hawk, the owl, the red squirrel, the blue jay, are many times over more interesting, to all but shooters—surely a minority—than are the weaker, hen-like, undeniably stupid species that go so much better when roasted.

The tendency is toward a domestication of our so-called "wild game". Certain species of foreign origin are so tame that hunters have difficulty making them fly away so they can shoot them on the wing. Ducks are fed and pampered until in many cases to shoot them seems like a betrayal of some docile barnyard fowl. Protected against natural enemies, coddled and tamed by being fed grain in the winter and by long periods during which shooting is suspended, the wild game birds of America are rapidly becoming manicured into a state approaching that of the domestic chicken. This is quickly brought about because the nature of these birds, as that of all non-predatory creatures, is to surrender to whomever will feed them.

Thus, by elimination of the proud and intelligent predatory species, and a taming of the more docile-minded dullards, the outdoors of America would lose its distinctive character, would become a park-like nonentity, devoid of the interest that only predatory wild life can give —the red squirrel, the crow, the blue jay, the hawk, the owl, made public enemies in the interest of more Hungarian partridges, Chinese pheasants, and other placid table-ware that represents the hobby of a part of our population.

Paradoxically, most of the "vermin" elimination is accomplished close to towns and cities, where the most people enjoy the outdoors, but where the fewest hunters hunt and the least number of game birds exist.

The "vermin" birds and animals give life to our nearby woods, and the predatory beasts of the North and West surely constitute a valuable, if somewhat sentimental or purely esthetic, resource of the country, giving to the American outdoors its only claim to a touch of wildness, delighting the thousands who go there for recreation. Under any plan of administration that honestly contemplates the greatest pleasure, happiness, and recreation of the greatest number of people, surely the delight of a boy in watching a red squirrel scampering through the trees will be matched, thrill and thrill, against that of a hunter who shoots a quail; the cry of the coyote in the West, so linked with an historical and purely American background, will be judged only against the actual harm that the coyote is known to do; the circling hawk, even the flocks of crows, the woodland owl, all of the wild creatures so widely and perhaps hastily condemned, will be given full consideration as an integral and important part of our outdoors, as our outdoors represents the property of all citizens.

It is difficult to argue in behalf of abstract or esthetic values. It is true that many silly things have been done under this banner. But such values nevertheless do exist, and not only exist, but have a much greater influence in forming a national character than perhaps is realized. It seems perfectly clear that we are on the verge of a new awakening to such elements, a new alignment of values. Irrespective of the merits or demerits of current means for bringing it about, the fact remains that we are surely headed for a more leisurely pace, a broader distribution of our time, a finer appreciation of natural beauty, and, in the long run, a national temperament attuned to a more thoroughly civilized mode of life, conscious of aspects other than those devoted to the struggle for money.

The outdoors stands on the brink of a new use, a broader use, by infinitely more people. With more leisure for all, the outdoors will achieve an importance it never has enjoyed. It should be regarded in that sense, as the playground of the people, as their source of pleasure and health and moral well-being and strength, and the wild things should be regarded as a part of it, without which it would be incomplete, innocuous, and totally un-American.

The American outdoors has gone through the fire of exploitation and of wholesale, wanton destruction. Its very character is endangered by turning it into a breeding park for semi-domestic game birds, and by sweeping away the very essence of Western charm from the mountain ranges. It still remains the greatest and most valuable moral asset that America possesses, and to change its basic nature to the advantage of any one group becomes increasingly out of keeping with the trend of our times.

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ABSTRACT OF FUR LAWS 1935-36

The Biological Survey has issued in mimeographed form an abstract of the state and provincial laws governing the capture of our wild mammals commonly referred to as fur-bearers. Time and space forbid any detailed discussion of the laws and their implications, but a brief consideration of those affecting the marten is of interest.

Alaska, not long ago a fertile field for the marten trapper, has a closed season this winter, presumably because the stock is considered to be dangerously low. But among the states along our northern border and in the western mountain areas, only Michigan, Minnesota and New Hampshire have closed, with marten all but extinct.

At the same time Maine and Vermont and New York, whose marten have a similar dangerous status, continue their pursuit of the few remaining. Idaho, Montana, Wyoming, Oregon and Washington, all of which have a few marten, also continue to allow trapping to continue —that is—to proceed toward the extermination of this beautiful and valuable animal.

In Canada, where conditions are similar to those in Alaska, only Manitoba, Nova Scotia, Saskatchewan and Newfoundland have closed the season on marten, although in a few of the provinces the animal is in a condition nearly as dangerous as in our own border states. Even in the wilder provinces and territories of Canada we doubt if there is one marten now where there were fifty 30 years ago.

Thus it seems that our state governments are no more concerned about the supply of the more valuable fur-animals than they are about the game birds.

Let's Get Together

By ARTHUR N. PACK

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NATIONAL FOREST

NATIONAL PARK

THERE is no more vital or fundamental issue confronting conservationists today than the necessity of closely coordinating those governmental activities concerned with the administration of our renewable natural resources. We have voiced this conviction in previous articles in this section. We have received interesting reactions from them, some of these indicating the advisability of further clarification of our views on this important question.

Basically, what we have said in the past has been directed to showing how conservation under our federal government is working at cross purposes without definite leadership or plan, each bureau intolerant of another, each blindly following a single track through hell and high water. Is the theory of absolute protection and preservation upheld by the National Park Service correct? Of course it is, *within limitations.* Is the Forest Service theory of multiple use correct? Also yes—*within limitations.* But what are those limitations? Who shall decide as to the real needs of public land management as applied to any particular area?

Suppose we take, for example, the current squabble over the proposed extension of the Olympic National Monument, to make it over into a National Park. Here is a great area with exceptional potentialities for public recreation. Here are the Roosevelt elk, deserving of such degree of protection as will guarantee their continued existence in perpetuity. Here are splendid virgin forests of giant Douglas fir, western hemlock, and cedar. Here are lakes and streams for fishing; a camper's paradise. It seems natural to say, "Let us lock them up and keep them forever safe for the people of the nation." But here are also communities dependent upon forest products—lumber and pulpwood. Surrounding the proposed park area are also forests now being destructively logged and reduced to a condition of devastation. Just because these forests are outside of proposed park boundaries, are they to be abandoned to destruction?

Along comes the Forest Service and says to these local communities, "We have a plan for perpetually reproducing forest management of this whole area to prevent devastation both within and without the proposed park boundaries. Such a plan can not be put into effect, except by contractural arrangement with private owners and with sufficient timber grouped under a single management plan to guarantee permanent sustained yield. Take away part of this timber by locking it up forever in a National Park, and there is no possible alternative for the adjacent timber but to permit the continuance of the present destructive logging practices which will soon result in destroying the livelihood of many Olympic Peninsula communities." Promptly a multitude of local Chambers of Commerce vote against the proposed National Park.

Then comes the Park Service back again. Say their spokesmen: "We have money to spend for roads and development. We will bring you thousands of tourists. Your people will thrive on the money which we shall have brought in. Vote for us."

To the sportsmen the Forest Ranger says, "Beware. This is a deep-dyed plot to ruin all your fun." To the stockmen he says, "The Park Service won't permit you to graze a single cow where you have been so doing for years."

Prejudice—prejudice—exploitation countered with exploitation promises—prejudice again. And, after all, where are the *real* issues?

Suppose that the Forest Service and the Park Service (now separated by a wall of hatred and distrust, which historically has divided the Departments of Agriculture and Interior) were brought together under a single bureau. It would then be possible to work out a compromise that is really in the public interest. It is not proposed by the American Nature Association that the inviolate features of the National Parks should be disturbed, or even limited against further extension. This inviolate character is and should be forever guaranteed by law and supported by all the people of the nation against change. But, in consideration of special areas—such as the Olympic Peninsula—there might be set up a special kind of national recreation area which partakes of the character of both Park and Forest. Under such management as we

propose, lumbering, grazing of domestic stock, wildlife management, and recreational development could and should be separately considered.

Does wildlife need absolute sanctuary permanently, or only for a time? Let it be so determined on the basis of scientific research and fact.

Should grazing of domestic stock be absolutely prohibited or only carefully restricted? Let it be so decided independently?

Should certain areas be opened for carefully guaranteed selective logging from time to time, as part of a larger scheme for forest protection and preservation over a greater area, and as a means of supporting rational community life? Then set up such a perpetual plan, only providing that special scenic spots, or strips, be exempted where the interests of recreation require.

Such a scheme of land management as this the Park Service, as at present constituted, and rightfully limited, can not secure. Such a plan as this the present Forest Service is unable to bring about without the assistance of the trained forces of both the Park Service and the Biological Survey in full and complete, centrally directed harmony.

Many of our present National Parks most urgently need extension for the purpose of securing adequate winter range for game animals. One of the chief obstacles to these extension plans is a strong feeling in the West against the absolutely inelastic features of National Park theory. Most of our western National Forests, in such states as Montana and Wyoming, also need additions for the sole purpose of supplying winter range for game. Yet there have been instances where bureaucratic jealousy and conflicts have been used to prevent such necessary conservation measures.

It is our belief that real progress in federal conservation of renewable natural resources can be brought about only on the basis of drastic reorganization of federal bureaus, grouping all functions connected with conservation under a single Bureau and in that department which has had the most practical experience in managing renewable resources—the Department of Agriculture. We do not propose to destroy the unity of the National Parks, to change one whit the inviolate character that they now possess or to limit extension of the National Park theory, except, in the last respect, to fit it into a larger plan of conservation.

A group of conservationists is even now working on a definite plan for reorganization of the federal bureaus in accord with these ideals, endeavoring to safeguard for the future the useful and necessary functions of federal conservation, and, at the same time, to eliminate such waste and duplication as can never be otherwise prevented. Such a plan need not be the surrender of the underlying principles of National Park management to any high-sounding phrase, such as "Multiple Use"; nor is it an undue limitation upon the theory of Multiple Use to restrict its application to the circumstances and scientifically discovered needs of a particular area.

It would indeed be a shame if the age-long controversy between forests and parks should ever be resolved as a real victory for either side. By no means is a questioning of policy of the Park Service intended to be a loyalty to the Forest Service on the part of the American Nature Association; nor should any such loyalties, wherever expressed, be at the expense of support of the best wildlife policy, recreational policy, or forest policy. We simply feel, as did "Ding" Darling when he resigned as head of the Biological Survey, that true conservation is running up a series of blind alleys, and, until it gets a new and definite start, it is, in the main, getting exactly nowhere.

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Canned "Duk-kalls"

An item that appeared in many papers about October 15 announced that hunters using phonograph records of the calls of live decoy ducks to entice wild ducks would be subject to arrest. This referred to a ruling made by Judge Merrill E. Otis, of Kansas City, in denying an application for a temporary order sought by Ernest A. Schroer and Robert Stocker, manufacturers of "canned quacks", to restrain the Chief of the Biological Survey and his game wardens from arresting hunters using the records. This brought to public attention a device that shows to what depths of shamelessness duck hunters may descend, and still consider themselves sportsmen. It seems that two such "sportsmen" living in Kansas City, Missouri, conceived and effected a plan to outwit those who are trying to preserve our endangered waterfowl. They made some records of the calls of live decoys, organized a company, and manufactured them in quantity. This company offered the records at $5.00 each to individuals or clubs, to be used by the purchasers or rented. We have a copy of the publicity and are astounded at the heartlessness evinced by those who would sell, buy, or advertise such a contrivance. The advertising matter makes no mention of anyone in the world having objected to such an ingenious device; oh, no. But it does describe the arduous efforts, finally successful, to obtain the records. It alludes in touching terms to the cruelty of government in banning live decoys, but "nobody can keep a duck hunter down". It reprints publicity put out by More Game Birds, announcing the impending invasion of forty million ducks from the Canadian wilds, and invites all and sundry sportsmen to get their share, for "wild ducks won't have a chance this year, despite the president's proclamation ruling out the use of live decoys".

THE BEGINNING OF A LAKE
The first of seven beaver dams, 50 feet long and seven feet high, that made the lake below

OUR BEAVER

By DUNC STORMS

As FOR the beaver I submit that our beavers do not belong to any individuals, clique, group, or bureau of humans, and that the work of the beaver is too important, and affects too large areas to be in the hands of any one state. That a beaver colony working on the head waters of the Colorado River in northern Wyoming "belongs to Wyoming" is absurd because its work helps the fruit growers of the far-off Imperial Valley in southern California, and, also, all along the flow of this mighty river; beavers on head streams of the Missouri River in Montana affect the cotton growers in Louisiana.

Our red brothers were right when they claimed that *Manitou,* the Great-Sky-Chief, *owned* our wild creatures. Therefore, our beavers belong to God; to Nature.

Nature wishes to *keep* her beavers among us because she has work for them to do. Nature will have work for beavers so long as rains fall, snows melt and streams run. *The work of beavers is erosion prevention.* Beaver engineering skill, his bark eating, his most extraordinary industry, his remarkable dams, all minister to this one end. No trained engineer selects a better site for a dam than the beaver, and could Nature have her way, she would have a suitable quota of beavers on every river of North America, especially in our Rockies where beaver extirpation has reached its high peak.

The work of the beaver ranks high in Nature's effort to reduce its desert areas. While Nature tolerates a certain amount of such areas, too much desert gives us floods, droughts, dust storms, ravished soils—Nature's rebuke to man's destructiveness.

The work of the beaver in preventing erosion cannot be estimated in dollars and cents. For every beaver we have destroyed we have paid ten thousand fold its fur value in forest, stream and soil ruination. Therefore, we should be content to confine our beaver activities to the use of camera and field glass, and be willing to wear other than beaver furs.

When Nature spreads one of her creatures over a continent, lets him survive civilization, as she has the beaver, she is telling us: Let this creature live. Few of us comprehend that most of our four-footed and winged brothers have the same right to dwell on this earth as we have. I believe Nature considers her wild creatures have first rights, because she so deeply resents their destruction, punishing us humans with insect and other plagues when we slay her workmen.

Certain groups tell us: "Beavers destroy trout." How can they do so? Beavers never eat fish. Their dams and ponds are favorite places for seeking trout. How can this strict vegetarian, whose work conserves stream flow, whose ponds and lakes become tree and brush shaded, kill trout? The answer is—they do not!

They say: "beaver ponds produce fungi that kill trout." As beaver defender and as a student of beaver life from the forests of the Canadian North to Lower California, from the Hudson to the Columbia, I say: Our beavers are not guilty. I admit that trout-killing fungi are to be found in certain types of beaver ponds, but the beaver is not the cause. The actual trouble-makers are not hard to find by those who have eyes to see.

I type this article by the Snake River rising in the Sierra Madre range of Wyoming on the Continental Divide, at an altitude of more than 6000 feet. This river was once a famous trout

A BEAVER-MADE LAKE
It abounds in trout although less than a generation ago its site was a wild horse pasture

stream. Now trout are to be found only in small beaver ponds way up on the tiny head streams, so this river is a good sample of the work of certain trouble-makers who have transformed all too many of our famous western trout streams into fishless pools. Certain groups are so blind that they put the blame for this on the beaver.

The trouble-makers along this river were: Fires and sheep. The axe has not ruined this river valley but much of its head stream country has been fire-shaven. Fire-killed forests still reach black arms to high skies. Nature could have restored her trees but for the work of our worst forest and stream destroyers, those wingless, four-footed locusts, commonly known as sheep. They devour every blade of grass and shrub as soon as it appears, and the soils, stippled by tens of millions of hoofs, have been scattered afar as dust storms.

The erosion-preventing beavers of this river have been reduced to near-extinction despite the state law protecting beavers at all times. So, instead of having a proper quota of beaver dams, these Snake River head streams are mostly beaverless. Every rain rushes down as a flood, and the snows on the mountains, instead of being held to melt slowly, rush valleyward in walls of waters.

Our beavers are being blamed for the work of the axe. After traveling more than one hundred thousand miles around our Rockies, Cascades and Coast ranges I am just beginning to understand how thoroughly we have axe-shaven our western mountain ranges. Not satisfied with one shave we gave them a second, more than skin deep, down into the sub-soils. The more we legislated against forest fires, the more we had. The more we tried to protect our forests against fires the greater they blazed, until during 1930 we had the unthinkable total of 198,000 forest fires in our United States, exclusive of Alaska.

Then we gave our western mountains a third shave, that was worse than the previous two combined. Sheep by the million—more than fifty millions of them—roam at large over our mountains. When sheep get through the subsoils are gone. When sheep finish, streams and rivers that a generation ago ran through tree-clad banks, whose pools teemed with trout, now dribble through valleys so shaven that they are deserts, barren, dusty, hot as a lime-kiln.

To blame our beavers for the evil work wrought by the axe, fires and sheep, is more than absurd.

That the majority of our people believe that beavers and trout dwell together in amity is proved by most of our states having a law which says in effect: "Beaver protected at all times." That a destructive minority have reduced our beavers to near-extinction is also proven because our streams do not have one beaver where there should be a hundred. Also, the great majority of beaver pelts now offered on our fur markets begin as "mule-skins"—illegally caught beavers—and by the golden magic of groups who are paid for protecting the animal, the pelts reach markets tagged: "Legal." One of our largest Rocky Mountain hotels is alleged to have been built from the proceeds of this beaver racket. At two dollars rake-off per pelt you can estimate the number of beavers required for a hundred thousand dollar building. Since every western state had and has its beaver-racket gang the numbers of beavers slain and stolen from the people who believe that beaver should live loom so large it is a miracle that a single beaver dam remains.

The cure for restoring a proper number of beavers to our streams is simple.

1. Five years of federal beaver protection. Protection at present is little more than a "racket."

2. Where our streams are ruined by axe, fire and sheep so that beaver ponds become too warm during summer and produce the lethal fungi, let all beavers along such streams be transplanted (not slain) to river head-streams having shade.

3. Educate our people, especially sportsmen and fishermen, to know that beavers do not kill trout. Present education is to the contrary, and false.

4. Remove all sheep from river banks and valleys. To replant forests, to replenish streams with beavers and still permit sheep to destroy both trees and soils is to conserve with our left hand while we destroy with our right hand and both feet.

To have men build dams to stop erosion is wise. To let Nature's greatest dam builders work as she wills along our head streams will prove wiser and far less costly. Five years of beaver work as Nature plans will prove so revealing that any person killing any beaver would be dealt with along with kidnappers and post-office thieves. Five such years will stop more erosion than all bureaucratic plans and man-made efforts combined. Ten thousand trout streams now practically troutless would each become a fisherman's paradise. Our present rampage of beaver destruction needs to be followed by an era of letting Nature have her way in her plan for man, beaver and trout to dwell together in amity. Nature knows best.

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DES LACS AND ARROW-WOOD REFUGES ★ ★ ★

The establishment of Des Lacs Waterfowl Refuge, and Arrow-wood Waterfowl Refuge in North Dakota was announced in October. Both are to be administered by the Biological Survey, and are now being developed by C. C. C. camps under its direction. Des Lacs, covering 24,000 acres east of Bowbells, is important as a nesting and resting place for the intensively hunted diving ducks. Its improvement entails an outlay estimated at $89,000 for materials and labor. Arrow-wood Waterfowl Refuge is about twenty-five miles north of Jamestown. It contains three good-sized lakes, and was formerly a prolific breeding area, but became impaired by drought. Through the operation of the C. C. C. camp now established there, it is proposed to impound the spring flood waters and distribute their waters in such a way as to benefit waterfowl and other wild life.

PRESERVING JACK MINER'S SANCTUARY

FOR more than thirty years Jack Miner has been host to migratory waterfowl at his sanctuary at Kingsville, Ontario. With the passing of the years this haven of goose and duck has become more and more famous, its guests have become more numerous, and the migration data yielded through banding more valuable. Now Jack Miner is approaching three score and ten and is concerned for the future of his beloved waterfowl and his sanctuary.

Although not large in extent—covering only about forty acres—the Miner Sanctuary has become a symbol. While the number of birds that have rested or nested there is few compared with the number that have bred in the nesting areas of Canada and been slaughtered from the blinds of the United States, Jack Miner's hospitality has stood as an example. As such, and as a continued tribute to its founder, it should be perpetuated.

JACK MINER AND TWO OF HIS BIRD FRIENDS
At the left Mr. Miner liberates a tagged or banded bird. On each leg band there is inscribed a selected verse of Scripture

During the three decades as host to the birds, Jack Miner has devoted his funds to the maintenance of the area, to banding, provision of food and other activities. He cannot leave it endowed, but he cherishes the hope that his work may be carried on. This hope takes tangible form in the creation of The Jack Miner Migratory Bird Foundation, a corporation set up to hold in trust funds contributed as endowment and to which the Sanctuary will be given. A distinguished advisory board will function in collaboration with the Foundation's officers who are, for the present, Jack Miner, his wife and his eldest son. Interested conservationists may obtain full information from Jack Miner, Kingsville, Ontario, Canada.

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THE PASSENGER PIGEON IN ★★ ONTARIO ★★★

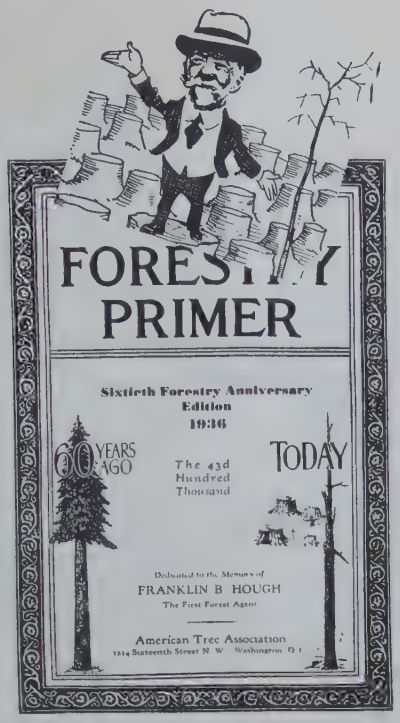
Ever since the last one of the uncountable millions of passenger pigeons died in 1914, the bird has been studied intensively from many angles. The latest important brochure that has come to our attention is published as No. 7 of the Contributions of the Royal Ontario Museum of Zoology at Toronto. Its author is Margaret H. Mitchell, and its publication was made possible by the Reuben Wells Leonard Bequest. Mrs. Mitchell inscribes the report to Paul Hahn, in recognition of his industry and generosity in collecting preserved specimens of the bird from all sources, and presenting them to the museum.

The author has evidently neglected no opportunity to obtain all possible details relative to the occurrence, abundance and local habits of this remarkable bird, from the accounts of explorers in the early part of the seventeenth century to the present. These extensive data have been judiciously quoted and digested and the result is a volume of 181 pages that would seem to be the last word in passenger pigeon lore as far as Ontario is concerned. Nearly all parts of the Province, as now defined, were visited by the birds, partly during their extensive northward incursions in search of new feeding grounds, following the breeding season. The species nested mainly in the southern part.

The report may be obtained from the Royal Museum of Natural History, Toronto, Ontario. The price is $1.00 in paper or $1.50 cloth-bound. E. A. P.

Forestry's Sixtieth Anniversary

FROM a one-man inquiry sixty years ago to the program of today is the stride forestry has taken in sixty years. In 1876 Congress appropriated two thousand dollars and Franklin B. Hough was employed to investigate timber conditions. This proved to be the starting point from which the present forestry structure has grown. Slowly, at first, and then more and more rapidly, a forest policy was perfected, National Forests were set aside and a far-reaching bureau of the Government, the United States Forest Service handling 172 million acres, was built up to administer this forest work.



Ten years ago, in commemoration of this first faltering step toward a forest policy, Charles Lathrop Pack, president of the American Tree Association, brought out *The Forestry Primer*. This book presented simply and concisely the facts of our forest situation, the vital reasons for forest protection. It was brought out as a means of arousing public appreciation of all phases of this problem.

The decade that has passed has seen important legislation enacted in behalf of our forests. It has witnessed a thoroughly aroused public consciousness of the importance of forests and forestry, to which *The Forestry Primer* and the educational work of the American Tree Association have largely contributed. Finally, it has seen the creation of the Civilian Conservation Corps and an emphasis on forest conservation, improvement and management that Franklin B. Hough could not, in his fondest dreams, have envisaged.

With the coming of the sixtieth anniversary of the first forestry step, the American Tree Association issues the Forty-third Edition of *The Forestry Primer*. During the ten years that have elapsed since its first appearance, four million, two hundred thousand copies of this booklet have been distributed. It has gone to schools and colleges, groups of young people and adults interested in conservation of this vital natural resource. The Forty-second Edition was dedicated to the Civilian Conservation Corps.

Now comes the Forty-third Edition, revised in recognition of recent progress, and bearing upon its cover a fitting dedication to Franklin B. Hough.

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Bird Treaty Act Upheld

ANOTHER important case involving the right of the Secretary of Agriculture, through his agents, to enforce regulations intended to protect migratory waterfowl in Illinois has been decided recently in favor of the United States, and the birds.

On July 30, 1935, certain regulations made by the Secretary of Agriculture, concerning the seasons and methods of taking migratory game birds, were approved and proclaimed by the President. These regulations, though much less drastic than the serious condition of the birds warranted, did not meet the approval of many hunters. We have already noted the results of two cases that involved the mourning dove, one in Colorado and one in Kentucky, both of which were decided in favor of the birds. Now we are able to report another case which, because of the prominence of the parties involved, and because of the great extent of the damage suffered by the waterfowl in the Mississippi Valley, promises to be of great importance.

G. G. Brandenburg, President of Illinois Sportsmen's Association, with five other waterfowl shooting-clubs and several individuals, operating in a section that has become notorious for its slaughter of waterfowl, sought to restrain Howard Doyle, U. S. District attorney for the southern district of Illinois, and all others, from enforcing the waterfowl regulations, alleging infringement of certain rights in hunting, and in property acquired and improved for the same purpose.

The case was heard before Judge J. Earl Major, who sustained the motion of the defendants to dismiss the case. The decision reviewed several precedents involving cases where property rights in game were claimed, and concludes:

"It is the conclusion of this court from a study of many cases that it is the general and perhaps the universal rule that public officers will be enjoined from the enforcement of State or Federal laws only when the party seeking such injunction has a definite property right which will, without such relief, be damaged or destroyed.

"It is the judgment of this court that 'the matter in controversy' does not exceed $3000.00 and the court is without jurisdiction. Also, that no property right of the Plaintiffs is involved that would entitle them to an injunction under the circumstances here presented. Having reached this conclusion there is no occasion to consider other questions. The bill of complaint is dismissed."

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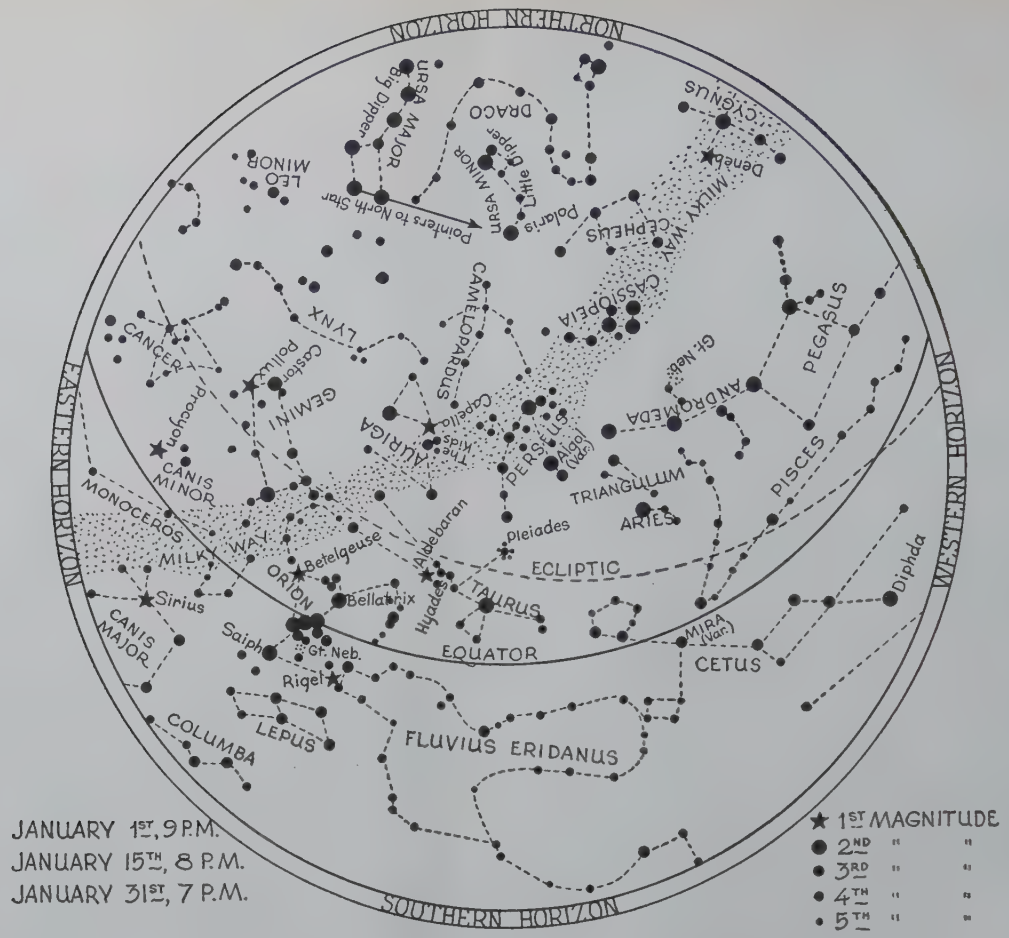

To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south

The New Year in the Heavens

What the astronomer predicts for 1936

By ISABEL M. LEWIS

So expert has the astronomer become in the prediction of the exact times and circumstances of a total eclipse of the sun by the moon that observers now consider they have a cause for complaint if the eclipse is late, or early, by more than two or three seconds, or if the position of the limits of the path of totality are off by as much as half a mile.

A chance to test again the accuracy of an eclipse prediction will be given on next June 19 when there will be a total eclipse of the sun visible in Europe and Asia. It is probable, if peace then exists in that part of the world, that there will be a number of eclipse expeditions along the path of total eclipse in Siberia and Japan. The maximum duration, which will occur about noon in Siberia in the vicinity of Bratsk, will be about two minutes and thirty-two seconds. The path of total eclipse will first touch the earth at sunrise in the Mediterranean Sea; will pass over Greece, the Sea of Marmora and part of Turkey early in the morning. Crossing the Black Sea, it will pass over southern Russia and Siberia, where it will run for a long distance close to the trans-Siberian railway. Among other towns in its path will be Kustanai, Omsk, Tomsk, Kainsk and Khabarovsk. Late in the afternoon it will leave the continent of Asia and pass over the Sea of Japan to the northern extremity of the Japanese Island of Hokkaido. It will then pass off to sea and leave the earth in the north Pacific at sunset. Partial phases of the eclipse will be visible over nearly all of Eurasia and the northeastern part of Africa.

There will be another eclipse of the sun on December 13-14, a fine annular eclipse with a maximum duration of seven minutes and twenty-five seconds. The path of the annulus, within which a thin ring, or annulus, of sunlight will be seen encircling the moon at maximum

eclipse, will cross Australia and North Island in New Zealand, and partial phases of the eclipse will be visible over all of Australia and many islands of the East Indies and South Seas.

Two eclipses of the moon will also occur this year. The first, on January 8, will be a total lunar eclipse invisible in the United States but visible in Alaska, northwestern Canada, the Arctic, Pacific and Indian Oceans, and Australia, Europe, Asia and Africa.

On July 4 there will be a small partial lunar eclipse, also invisible in the United States, but generally visible in Australia, the Pacific, Indian, and Antarctic Oceans, most of Asia and Africa and eastern Europe.

For all those who are interested in observing occultations of stars by the moon, the year 1936 will be particularly barren in the occultation of planets and bright stars as compared with the past year. The brightest star occulted in 1936 will be Delta Scorpii, a star of 2½ magnitude, and there will be no occultations of planets visible in the United States this year. Mercury and Jupiter will be occulted once each, Mercury on September 17, in the southern hemisphere, and Jupiter on November 17, visible within the tropics and part of the southern hemisphere. Venus will be occulted on February 20 but this will not be observable anywhere south of the 49th or north of the 70th parallel of latitude. It may be seen in parts of Alaska and Canada.

One of the most interesting astronomical events of 1936 will be the temporary disappearance of the rings of Saturn for two or three days the last of June and first of July. Then the earth will lie almost exactly in the plane of the rings so that they will be viewed edge-on from the earth. For a few hours the rings will disappear from view even in the most powerful telescopes and for several days they will appear as a thin needle of light extending to either side of the planet for a distance about equal to its diameter. This happens twice in the period of the planet's revolution around the sun, or at intervals of thirteen or fifteen years. It takes about a year for the earth to complete its transit of the plane of the rings and during this time there will be one, or three periods when it will cross from one side to the other of the plane of the rings. About June 30 of this year the earth will be almost exactly in the plane of the rings but will not cross it. The actual crossing will take place about February 21, 1937, when the earth will pass from the north side to the south side of the plane of the rings. It will not be a favorable time to observe this unusual phenomenon, however, as the planet will be at that time too close to the sun to be well seen. The temporary disappearance that will occur in 1936 will be far more interesting as it can be seen under favorable circumstances. As the width of the ring plane of Saturn is estimated to be less than fifty miles it is readily seen why they practically disappear from view when placed edgewise with respect to the earth. The rings are seen at their greatest width about seven or eight years before and after this period when the earth is at its greatest elevation above the plane of the rings. Throughout this entire year the rings will appear extremely narrow and from June to September will appear like a thin line of light. The ball of Saturn, which is usually partly hidden from view by the rings, will be seen under the most favorable circumstances and the flattening of the planet which is the greatest for any member of the solar system will then be very noticeable, as also its belts and other surface features.

During the year 1936 solar activity will increase, as manifested in the increase in the number of sunspots and prominences, and greater brightness of the faculae, or brilliant flecks of light on the surface, that appear in greater number and intensity in the vicinity of sunspots. This is an intermediate period between the sunspot minimum of the later part of 1933 and the sunspot maximum which will occur in 1938 or 1939, and many sunspot groups may be expected to appear during the year, increasing continuously as time goes on in number, size and activity. Greater disturbances than have occurred in the past few years may be expected in radio reception and in the intensity of magnetic storms and auroral displays that are closely connected with solar eruptions will be more in evidence.

The motions of the planets through the constellations of the zodiac during the year may be predicted most easily in the case of the slowly moving outer members of the solar system. The little planet, Mercury, and Venus, to a less degree, move so rapidly with respect to the constellations that their motions cannot be followed so readily with respect to the stars. Neptune, which cannot be seen without the aid of a telescope, will be found throughout the year not far from the star Sigma in Leo. Uranus, which can be seen as a faint star of fifth or sixth magnitude if one knows just where to look for it, will remain in Aries during the entire year and Saturn will be in the eastern part of the constellation of Aquarius, and will be seen whenever this constellation is visible. At the beginning of the year Saturn will be low in the west and will be in conjunction with Mars on January 25. After conjunction with the sun on March 3 it will be a morning star coming into the evening sky in the summer months. Mars will not be favorably placed with respect to the earth this year. Early in the year it is low in the west in the evening and passes to the morning sky after conjunction with the sun on June 11. After that date it will be a morning star for the remainder of the year. Jupiter will remain in Ophiuchus until November, when it will pass into Sagittarius. It is a morning star early in the year and in conjunction with Venus on January 15. In the summer and fall it will be seen in the evening sky once more. Venus is now a morning star, also, and will return to the evening sky after conjunction with the sun in June.

Mercury is at greatest eastern elongation on January 16 and may be seen in the evening twilight low in the southwest around that time.

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Trailside Treasures

THE NEW YEAR'S GUEST

By JANE ADAMS PARKER

As Grandpa Arnold opened the long narrow box, the three children and Aunt Dot crowded close to see what the Christmas gift could be. First he lifted the packing of shredded tissue paper, and then, very carefully, took out the strange something and put it on the table.

"Oh, oh," said Jo, letting out little puffs of breath in her excitement, "what is it, Grandpa?"

"It doesn't look very vicious to me," said Jerry. "It looks like a long twig of some kind."

"Is . . . is it alive?" asked Rosy.

"No, indeed! If it was, it would start hitching along, on its funny crooked legs, as soon as I opened the box," said Grandpa.

"Like a little old man with the rheumatism," laughed Aunt Dot. "That's the way it always looks to me, when I see a walking-stick out for a walk. This is a fine specimen, though. I should say it is about ten inches long, and all mounted ready to put in one of the cases. Let's hurry back to Trailside Treasure House. Then we'll have all the time we want to examine it closer."

At her words they started gathering up their wraps, while Grandpa Arnold put out the fire.

"My, how cold our dear old woods can get," said Rosy. "Just listen to the wind whistling through the trees."

It had started to snow heavily as they reached the museum. So they stopped a moment to shake the wet flakes from their clothing before scampering upstairs.

"It's strange we haven't found some smaller walking-sticks in the woods around here," said Grandpa Arnold. "I've seen them two or three inches long. But they look so like a twig that it's hard for even the 'seeing eye,' to find them. Down South they are most a foot long. And in the real tropics, where it is very, very warm, some kinds have wings. Only they keep them so tightly folded when at rest, that it's hard to tell they are wings. Now get your magnifying glasses and see what you can find out for yourselves."

"It's an insect," said Jerry promptly, "because it has six legs. And it has its body divided into three parts," he added quite proudly, "the head, the thorax—where the legs are—and the abdomen—the part back of the body."

"Its legs are jointed and flattened at the upper joint," said Jo.

"And the legs, thorax and abdomen and antennae are all long and slim," said Rosy, studying the walking-stick quite solemnly, through her glass.

"Well, these little people are really learning how to use their 'seeing eye,' all right, and their magnifying glasses too," said Grandpa, turning to Aunt Dot.

"They certainly are," said Aunt Dot. "These months of treasure hunting have given them some things that a lot of grown-ups miss."

"He has funny pop-eyes," laughed Rosy. "What does he eat?"

"He eats the leaves of most any sort of tree. And he is quite a little trick performer too. Sometimes he hangs from one foot, sticking out so stiff that you'd be sure he was a twig. Some of them have brown bodies with green legs and some are brown all over, like dead leaves. The mother walking-stick drops her eggs one by one to the ground, just anywhere. And sometimes they lie on the ground for two winters before they hatch out. The young walking-stick looks like the parents, only much smaller. But they climb up into the trees and eat and moult until grown," said Aunt Dot.

"And sometimes they are such greedy little fellows they almost strip the leaves from the trees," said Grandpa.

As he was speaking Ben came into the room, and with a very mysterious smile motioned Aunt Dot into the hall. They heard the two whispering together a few minutes. Then Aunt Dot came into the room again. And this time she had a very mysterious smile, as she said, "Ben has just brought the news that there's a little New Year's Guest come to spend the winter with us. He's out in the store-room, now. And I thought it would be nice for us to go out and welcome him." (To be continued.)

•

THE STORM

By ESTELLE HOOD

Four baby robins in a nest,
Away up in a leafy tree,
Were roughly rocked and tossed by gales
Like sailors on a stormy sea.

The rain splashed through the roof of leaves,
And gave them all a sudden chill.
How glad were they when mother dear
Flew back with earthworms in her bill!

She thrust a piece down each wide throat,
Then spread her wings above the nest.
They snuggled close to get real warm
Beneath her warm and downy breast.

Their daddy perched upon a stone,
And gayly sang, "Cheer up, my dear!
Fine beefsteak worms are on the lawn.
You shall have plenty, never fear!"

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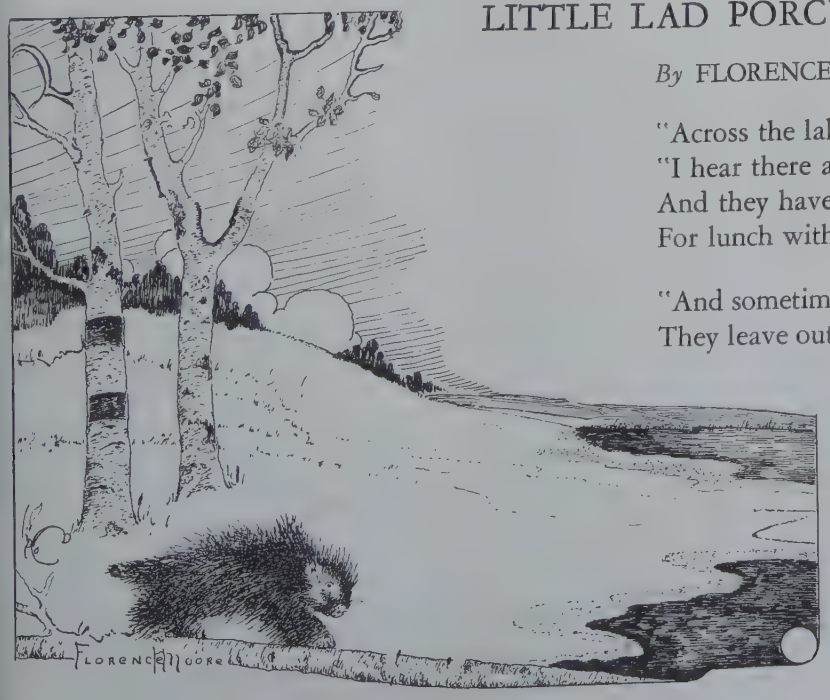

LITTLE LAD PORCUPINE GOES CAMPING

By FLORENCE H. MOORE

"Across the lake," said Little Lad,
"I hear there are some campers;
And they have always something nice
For lunch within their hampers.

"And sometimes when they come up here,
They leave out something sweet,
Perhaps a bit of candy,
At night for me to eat."

And as we sketch his picture,
We'll hide the letters of his name;
Let's see who will find them first.
All ready—start the game.

PUZZLE: Also find Mr. and Mrs. Camper.

SNIFFERS

By
MAHONEY
CHILDE

A LITTLE girl in blue overalls leaned up against the trunk of a mulberry tree. One hand was thrust deep into one pocket; in the other were some peanuts. Her face, although tear-stained, wore an unusually bright expression. For a young miss of six she stood quietly and seemed interested in the ash tree across the sidewalk. Behind her were rose bushes in full bloom. Large and friendly ferns clustered about the steps of the house. The door opened. An aproned figure stood quietly in the doorway.

"Has he come back, Sweetlove?" At the question, the little girl turned hopefully.

"No, Ma Carrie, but I know he will, 'cause he was little; looked sick. I know—"

"If he's sick you'd better keep away from him. Squirrels have distemper and you might get it. I suppose he won't come close enough, though."

"Sh! There he is now. Wait and I'll show you how he does."

Both stood in silence for several minutes. All the time the squirrel was coming closer. When he got within six feet of the waiting child he paused. She tossed him a nut. Greedily he snatched it then sat studying the situation while he ate it. He was small and sick, but there was no doubt what was wrong. Across the street lived a young Nimrod, at least he thought himself a mighty hunter, but he was more of a menace to the community than anything else. One of his well delivered B-B shots had missed its mark—the young squirrel's heart—but had struck his eye blinding him. Closer and yet closer the youngster lured him by throwing each nut nearer. When all were gone she put her hand into her pocket. After waiting, head on one side for several seconds, the young beggar scurried away. The child turned: "I'll have him eating out of my hands some day. I'm sure he isn't at all afraid. Do you think he is, Ma Carrie? You know I wonder if God knew I was lonely after Bill got poisoned and just made the little wild squirrel come to me. Or maybe he was just awfully hungry and couldn't get enough food. Did you see how he had to turn his head on one side to see anything? He looked to me like he was hurt."

"He is hurt! Somebody has shot out one of his eyes. Poor little thing."

Days passed. One day our young squirrel charmer burst in on her folks to announce that Sniffers—"I'm going to call him that because he just smelt all over my face with his little black nose"—had sat on her shoulder, run around her small body as if it had been the trunk of a tree, and dived into her overalls' pocket after a nut. Later in the summer he learned to come when called, would hang from anyone's hand, but most of all loved to play in someone's hair. People came from all over the township to watch Sniffers. He was just a gray squirrel, and there were lots of them around. But Sniffers was different.

Fall came with its cold days. Sniffers worked hard carrying away nuts and burying them. Also he liked to carry away soft rags, cotton, or twine. These he was weaving into a nest in the crotch of a tree near the house. If anyone came out without calling him he was apt to drop on their head without warning and scold them.

Early one morning a shot was heard across the street. All day Sniffers didn't come. That day was dreadfully long, terribly lonesome. By evening the family were sure Sniffers had been killed.

The little girl knelt beside her bed that night and said, "Please avenge Sniffers' death. He was a very good squirrel. If You can't make that bad boy suffer for what he did to my squirrel, please protect all the other little squirrels. Amen. Ma Ruth, does God hear prayers about animals? Why did He let the neighbors poison my kitty Bill so I could have a pet squirrel, that's what Grandpa Haines said He probably did that for, and then let that boy shoot my squirrel?"

There is no record of what "Ma Ruth" replied, but it is true that before the next spring there was a twenty-five dollar fine levied against any one who harmed a gray squirrel within that township.

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WINTER STOREHOUSES

(Continued from page 12)

the ousels regretfully follow them down to open water. Longer migrations have become unnecessary since adaptation has been made to the aqueous environment. The ousel's winter residence and economic independence are assured by his ability to secure, during this season, aquatic larvae of May flies, damsel and dragon flies, of water beetles, and such small crustacean and other water life as may be garnered by diligent search in the icy currents.

When our trail broadens to a road, lights twinkle in the early dark. Quite suddenly they are obscured, turned off as it were, by a sudden slanting drive of wet snow. Under the influence of rising temperature the moist snow crystals dissolve to raindrops. The rain settles to a drizzle and one can hear the slushy thudding of snow being dumped from bent trunks and limbs as the deciduous trees quickly unburden themselves; the evergreens follow their example more slowly. Hurrying up the back-steps at home, we breathe deeply of the warm exhilarating air of a thaw.

Should the weather, in a characteristic about-face, succeed the thaw with a cold snap, every exposed branch and twig may be lacquered with silver ice. It is with such crises that the right of each and every species to remain in winter's territory is sternly tested. Yet, to those who are fit for the struggle winter's storehouses are open.

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Nature Magazine in School

A Department of Aid to the Teacher

In order that teachers and parents may further use Nature Magazine as an aid to the study of Nature and Science, this page is devoted to the following brief notes based upon articles in this issue and suggesting ways in which they may be used as a source of inspiration and information. To bring these Nature study thoughts to our readers we have obtained the services of one eminently qualified for the task, and this department is edited

BY ESTHER SCOTT

Instructor in charge of Elementary Science Washington, D. C., Schools

●

WINTER STOREHOUSES

In this most interesting article the author takes his reader on a walk with him through the snow-bound woods of the Rockies. He shows how each bird surviving the winter in this habitat must be equipped to meet the hardships. He points out the relation of the environment to the life of the birds. For instance, the crossbill's way into the pine cone's treasure, or the pileated woodpecker's great bill with which he can drill to the borers deep within the heartwood.

Since one of the best ways to evaluate our teaching is to see to what extent the topics discussed in school function in leisure time, we might try out our older pupils to see if they find pleasure in reading this delightful article. Teachers of younger children will find it inspirational in its teaching suggestions. If persons who read this article for themselves, or have it interpreted for them, can feel a surge of sympathy for the wild creatures, some degree of understanding of wildlife and its problems has been achieved.

●

OKLAHOMA CACTUSES

Since many school systems are now experimenting with integration of subject matter, natural science topics that readily merge with those in social science are always enthusiastically received. The cactus is such a topic. It belongs in a social science unit on Desert Life, or in a natural science unit showing the various types of living things found in special environments. This article, dealing not only with varieties of cactuses, but with methods of cultivation, presents many ideas helpful in setting up an indoor cactus garden. In many classrooms these consist of dishes of sand containing one or more small plants; often there is an accompanying card of direction indicating conditions of soil and moisture necessary to growths.

●

MICROSCOPIC GREEN MANSIONS

Here are suggestions valuable to the teacher of general science in the junior high school, as well as teachers of biology in the senior high school. Occasionally, however, there may be some gifted group in the elementary school who could enjoy and profit by seeing these tiny plants through the microscope.

●

SABA: A CIVILIZED OCELOT

This is a delightful story of an unusual pet, a story that could be read with pleasure by anyone interested in animals. As young persons are often intrigued by the unusual, this story could be used as an introduction of the study of mammals.

●

MANY KINDS OF MIRAGE

This interesting article should be saved for use along with other material in arousing interest in units dealing with the air, and with light. It would be especially appropriate in connection with the experiments dealing with refraction of light.

●

ROTOGRAVURE SECTION

These interesting, educational pictures should attract children as well as grown-ups. The picture of the young birds and the woodchuck might appeal even to the younger pupil who has not yet gained facility in reading.

The pictures of the modeled specimens in the Buffalo Museum of Science may bring up the question of killing and mounting specimens for the school museum. The argument against mounted specimens applies with even greater force to school collections than to city museums as the former are so much more numerous than the latter. In the face of the rapid decrease in the numbers of many species, particularly birds, is it fair to deplete the numbers still further by killing specimens even if they are used for educational purposes? Anyway it is so much more interesting to study living creatures either in the wild or as pets. Instead of mounted specimens the school "museum" might well contain models of living animals made by the pupils who would value them more highly than mere stuffed specimens.

●

WHOSE WILDLIFE?

This question is well asked. It is high time we did something about it. The majority of people, and certainly the pupils in our schools, are interested in the whole of the outdoors. The trouble is that this great majority is silent, letting the so-called sportsmen and the manufacturers of ammunition make all the commotion. What is needed most is a united front in education circles. First the individual teachers must be aroused, and then, working through groups of teachers, they can spread the gospel of conservation.

Now that our country is settled from the Atlantic to the Pacific, wildlife cannot long survive the warfare of man. Fortunately in schools something can be done about it. During the period of youthful openmindedness, it is possible to present the facts and develop an attitude regarding the significance of the balance of Nature. However, it should be noted that this attitude develops from many experiences; looking at pictures, drawing pictures, listening to stories, reading, asking questions, constructing, dramatizing, and caring for pets and gardens. Throughout each of the years of school, life science courses should aim to develop an understanding of the interdependence of all living things. This thought should be brought out through activities dealing with birds, mammals, fishes, reptiles, amphibians, other creatures, and plants. This particular article provides the teacher with excellent anecdotes that she could adapt to any grade level. If the theme of interdependence is inspiringly presented on each grade level, sooner or later there comes into the minds of pupils some realization of the fact that the time may come when man will have great need for species now threatened with extermination; for we are surrounded by and cannot escape from the "web of life."

The beaver article in this issue follows this thought closely and should be used in connection with this article.

●

OUR BEAVER

This splendid article deals with a principle which ought to be fundamental in all science education i.e., man's place on the earth should be one of steward-ship and not of destruction. The school should provide the experiences out of which this attitude toward life develops. In the case of the beaver, there are excellent motion picture films on the market; some splendid articles have been written, especially those by Vernon Bailey. In observing and reading, pupils should be led to discover the adaptations to the environment of this most interesting and valuable mammal. Such ideas as the shape, size, and strength of the beaver's teeth, his use of his tail and the warm, waterproof fur should be brought out. Pupils in the intermediate grades and junior high schools could answer questions regarding the value of the beaver and how he controls floods. Lessons dealing with forestry should also include the beaver.

●

THE NEW YEAR IN THE HEAVENS

Teachers will welcome this information concerning the important solar and stellar happenings of 1936. This year the eclipses are not visible in this country and the occultations occur with stars of less than the second magnitude; so the planets alone are of special importance to us. Teachers will find it helpful to make a chart showing the names of the planets, months of the year when they are visible and the constellations where they may be located. Such a chart is a real help in answering questions regarding the "bright stars."

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"Noah was a lucky man," says Dr. Robert Hegner in the opening chapter of his splendid volume, *Parade of the Animal Kingdom.* "His experience would have made a naturalist wildly happy. How thrilled he must have been as he stood at the head of the gangplank and watched the Parade of the Animal Kingdom march past him into the Ark." None can share Noah's experience or duplicate his opportunity, but the next best thing would be this book. Dr. Hegner has given us an unusual volume of natural history; an outstanding one, carefully planned by the author with the assistance of Jane Z. Hegner. The arrangement takes us from the minute forms of life up to Man. The text presents in simple, straightforward style the facts about the animals that the average layman or student wants most to know and finds most interesting. It treats with the appearance, life habits, methods of feeding and protection and relation to human welfare.

Further, this volume brings together a great wealth of information often only now to be found by consulting several different sources. It is a large volume of more than 600 pages. The text is furnished with 743 fine illustrations, and we know how painstakingly these were selected because Nature Magazine was happy to put at Dr. Hegner's disposal its own large file of pictures. No library—public, school, or college—should, in our estimation, be without this book, and many homes where young people are progressing through high school and college will find it a valuable addition to the home book shelves. The book is published by the Macmillan Company, and we are surprised to discover that the price is only five dollars.

The Story of a Deer

In *Monarch of the Glen,* Svend Fleuron has written a beautiful Nature story of a roebuck and his battle for existence from youth to old age. Born on a crowded game reserve, Piet, as the deer is named, is forced out of his native wood to struggle against man, beast and weather through a thrilling life, thrillingly and beautifully told by the author. E. M. Nielsen has made the translation and in so doing has preserved the charm of this writer's style. The book is published in this country by Henry Holt and Company at $2.50.

About Scientists

In *The Work of Scientists* Edith M. Patch and Harrison E. Howe have compiled a textbook differing from any we have seen. Its objective is, apparently, to give the young readers a general idea of what men and women working in the various fields of scientific endeavor have done and seek to do. Such a book should give a youngster with scientific leanings an extremely good idea of what lies ahead, and aid him in choosing from among the sciences the one that is of greatest interest to him and for which he seems to have the most aptitude. The book is well illustrated by Eleanor O. Eadie, R. Bruce Horsfall and Adrian J. Iorio. It is published by the Macmillan Company and lists at seventy-six cents.

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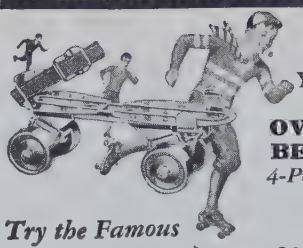

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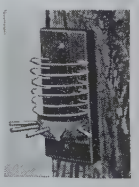

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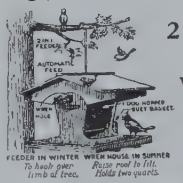

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Brevities

Midway point on the Appalachian Trail is Long Mountain. Mountain Club of Maryland recently designated this Pennsylvania location with a special sign, beneath which repose rocks "imported" from Katahdin and Oglethorpe—the A-T terminals. Who toted them this long distance? . . . The flour company insuring the housewife against baking failures has not yet extended the offer to campers—nor will they, Forum editor avers. . . . A discovery: South Dakota has the Black Hills Outdoor Club, two years old. Either Forum editor is a poor detective, or the BHOC is too modest to toot its horn. Full story in next Forum. . . . Distance is given in "Carter Whittaker" miles when president of the Georgia A-T Club leads a hike. Suspicion points to a good workout. . . . Two seperate one-day trips of the Wisconsin Go-Hiking Club were to the kettle moraine country of Southern Wisconsin. One hike included the highest elevation here—Lapham Peak, 1233 feet. . . . Several Sierra Club groups have been so hospitably treated on Mexican trips with the Club de Exploraciones that the Sierra Club now extends full membership privileges to their border friends. That's a true neighborly spirit. . . . Forum editor can match the "Little Switzerland" hike of the St. Paul Municipal Hiking Club, by ones he has conducted in Newfoundland, Russia and Stockholm—all in New Jersey. . . . A camping group with a pronounced wilderness complex limits canned goods to milk and fish. Selection of other foods made from the fresh, dried and dehydrated kinds. . . . New map of Stony Man region of Shenandoah National Park is varied in its pictorial scope—trails, forested mountain slopes, bald cliffs, bits of history seasoned with humor. Tom Culverwell, 435 Manor Place, N.W., Washington, D. C., will part with copies at 50 cents each. . . . Popularity of a permanent camp proves, in time, embarrassing to the culinary department, what with normal wear and tear. An annual "shower" solves the problem for the Omaha Walking Club. . . . Forum editor eagerly awaits outcome of Sydney Bush Walkers (Australia) debate, "That the carrying of heavy packs by women walkers be discouraged." 'Tis to be peacefully followed, next month, with a "Eats for Hikers" lecture. Nothing is said about serving of refreshments when lecturer gets through! . . . Little-known Helderbergs of New York are the tramping grounds of the Mohawk Valley Hiking Club. Details in a later Forum. . . . P.O., Box 1577, New Haven, Conn., will find the New England Trail Conference. List of publications sent for a stamp. Some are free; others cost from 5 to 50 cents. Subjects include New England trails, trail construction and light-weight camping. Timely at this season is *Ski Trail Standards,* 5 cents. . . . Sharing same post office box is the Connecticut Forest and Park Association, publishers of a series of Connecticut trail maps and pamphlets. . . . Cygian Society (New York City) has one group which takes shorter walks near the city. Other group goes farther afield on longer hikes. There is a joint hike each month. Alec Cole is Cygian president. . . . Virginia trail clubs had a jolly get-together over a recent week-end, thanks to the initiative of the Roanoke A-T Club. Other states please copy.

Hiking and Camping Forum

Conducted by
ERNEST A. DENCH

Hiking and camping inquiries will be answered by mail if a stamped addressed envelope is enclosed. Address the Forum editor.

Other items of clothing, footwear and equipment are manufactured by most of the 44 firms whose waterproofed specialties are listed in our "Let It Rain" bulletin. Their catalogs are free for the writing.

Few stores, except those in the larger cities, offer varied stocks of hiking and camping accessories. A study of catalogs during winter evenings at home will be time well spent. Our "Let It Rain" bulletin costs 10 cents. If you are a member, remit only 3 cents.

Gadgets Never Cease

1. A "tea ball" coffee of the instant variety. Nearest approach to *real* coffee Forum editor has tasted in this prepared form.

2. Folder giving varied recipes for bouillon cubes. Brand is packed 5 to the tin. Available in beef, chicken, mushroom and vegetable.

3. Western assorted candy package with Pacific northwest pictorial map on carton lid. Suitable as a gift to an outdoor friend.

4. Combined tent and sleeping bag. Weighs 8 lbs.; rolls into one piece. Maker of this innovation well-known for his sleeping bags.

5. Logs of highly-compressed western sawdust. Each log 10 lbs.; size 21" x 9½" x 6½". Log burns 2-3 hours. Can be sliced for camp cooking operations. Same firm makes a 10 lb. camp cook stove, folding type, with room for three normal-size pans.

6. A flare packed in a small cardboard drum; inexpensive; simple to use. No accessories needed. Provides a powerful light for 30 minutes. Especially useful for rainy or windy weather or for camping in the dark. Adaptable as cooking fuel.

7. Ski equipment firm's catalog justifies the use of innumerable gadgets for this sport by explaining the definite purpose of each article.

8. A pocket knife with a single blade which opens to the desired length by a slide arrangement. Blade, which thrusts itself forward instead of sidewise, is of razor steel. A keen-cutting edge ensured at all times by use of refills.

9. Combination waterproof match case, compass and magnifying lens. Pocket-size.

10. Two-thirds of a small booklet devoted to practical camping information. Other one-third describes tents, packs and bags made by the advertiser.

11. A neatsfoot oil paste, packed in a collapsible tube, for waterproofing, softening and preserving leather.

Christmas Pudding in Camp

Before the food scientists introduced vitamins to the world, the Christmas plum pudding was rated as a stodgy, indigestible concoction. This festive dish possesses all the nutritious elements necessary for a balanced diet. It is particularly recommended for Alpine camping by Carl K. Brunning, editor of the *Mountaineering Journal* (England). A can or two should be added to the winter commissary, as it is equally tasty and filling whether served hot or cold. It also contains such a body-heating ingredient as suet.

In his younger days a camping friend tried to lure the Forum editor on a Christmas week-end trip with the inducement of pork and beans. The F. E. decided in favor of a home dinner! The veteran camper who scorns fancy foods can now appease his conscience by the fact that the plum duff of British Navy fame now qualifies for the camp meal.

CCC Work on Maine A-T

CCC trail construction is usually too artificial to merit the approval of hikers, who object to graded surfaces—covering the natural soft earth bed with gravel and crushed stone. Railings and steps on the upper slopes of mountains are also resented.

Careful planning and close supervision by the Appalachian Trail Conference and the Maine A-T Club, in using CCC aid to complete the Maine trail links, are resulting in a satisfactory job. All growth, including projecting logs, is removed over a five-foot wide area, but the duff is left untouched. No hiker will mind the streams being easy to cross by bridges.

What's more, the proper spacing of lean-tos along the A-T will obviate the expense of sporting camps. Such lean-tos become public camp sites under the Maine law. If one camps elsewhere, he must employ a licensed guide.

The intense interest in Maine trails is proved by the A-T Maine guidebook being out of print. A second edition, incorporating all trail improvements and extensions, is now in preparation. Another year will be required before the Maine trail work in hand is completed.

Himalayan Photographs

Nanga Parbat Adventure will be prized more for its photographs than its text. A flat volume, large pages, reproduced by one of the gravure processes. You see the luxuriant beards acquired by the chief actors in the 1934 expedition, and the types of porters used. When the illustrations get down to serious business—glaciers, seracs, snow bridges, icy chasms, crevasses and high camps—you marvel at the skill of the photographers. One hundred and eighteen examples of their craft are included. The text, translated by H. E. G. Tyndale from the German of Fritz Bechtold, is in the easy-to-read narrative vein.

The most westerly Himalayan peak was the goal. Nanga Parbat rises the highest of any mountain—not excepting Everest—above the valley floor. 23,000 of its 26,642 feet is a vertical ascent. Camp VIII was es-

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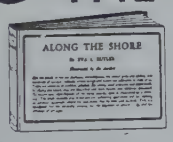

By
EVA L. BUTLER

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tablished at 24,540 feet, but blizzards, sickness and deaths prevented the party reaching the summit when it was so relatively near. It's a Dutton book, price $3.00.

Hikademic Degrees

The Huerfano Outing Club eschews the conventional annual banquet, replaced by pseudo "Commencement Exercises," which are varied each year.

The HOC directors preside at the head table in their hikademic (academic) robes. The styles are such as to turn a fashion expert's hair gray—inverted raincoats; hats turned inside out, with evergreen sprigs for tassels. Officers who usually go about hatless make headgear out of stockings and scarfs—the louder, the better.

The HOC rank and file receive hikademic credits based on the number of completed hiking and camping hours. The special achievement degrees include: T. G. (Trail Guzzler), the best hiker; G. W. (Ground Warmer), the best camper; C. P. (Cloud Pusher), climber of the more difficult peaks; W. S. (Weather Sopper), he who has braved severe climatic conditions. This gentleman is entitled to a copy of our *Let It Rain* bulletin as a special consolation prize.

In reality the honor badges are leather thongs, the number of knots denoting the accomplishments. Such distinguished members are obliged to wear, on the thongs, some gadget useful for a trail emergency.

This Walsenburg (Colorado) club is now in its third year. Ex-president Paul W. Nesbit, to whom we are indebted for the above information, mentions that—"The HOC defies the weather as all good hikers should, and is most active in the winter." Phillip Williams is now president of the HOC.

Feminine Pack Sharing

Two women lightened the burden of heavy packs on a Norwegian walking tour by pooling their supplies. A big pack contained all the bulky goods, chiefly clothing. This grossed 15 lbs. The small pack, a mere five-pounder, held all their small odds and ends, including lunches. The women changed packs each day. Where they could establish a base for one or more days, the big pack was left behind. The partners then shared, during walking hours, the toting of the small pack.

In Praise of Moccasins

John C. Van Dyke's experience with the moccasin is that it is the most pliable type of walking footwear. Although his greatest wear of the moccasin has been on Prairie Club (Chicago) hikes, the shoe has also proved its worth while climbing some of the Rockies. Van Dyke is his own shoemaker, using mule deer skin—Indian tanned, pointed-toe. The Sioux Indians sew them with a sinew, but Van Dyke prefers thin buckskin thongs. An upper like a spat is sewn on these thongs. Then comes the extra support—a heavy leather sole and heel, good for approximately 175 miles.

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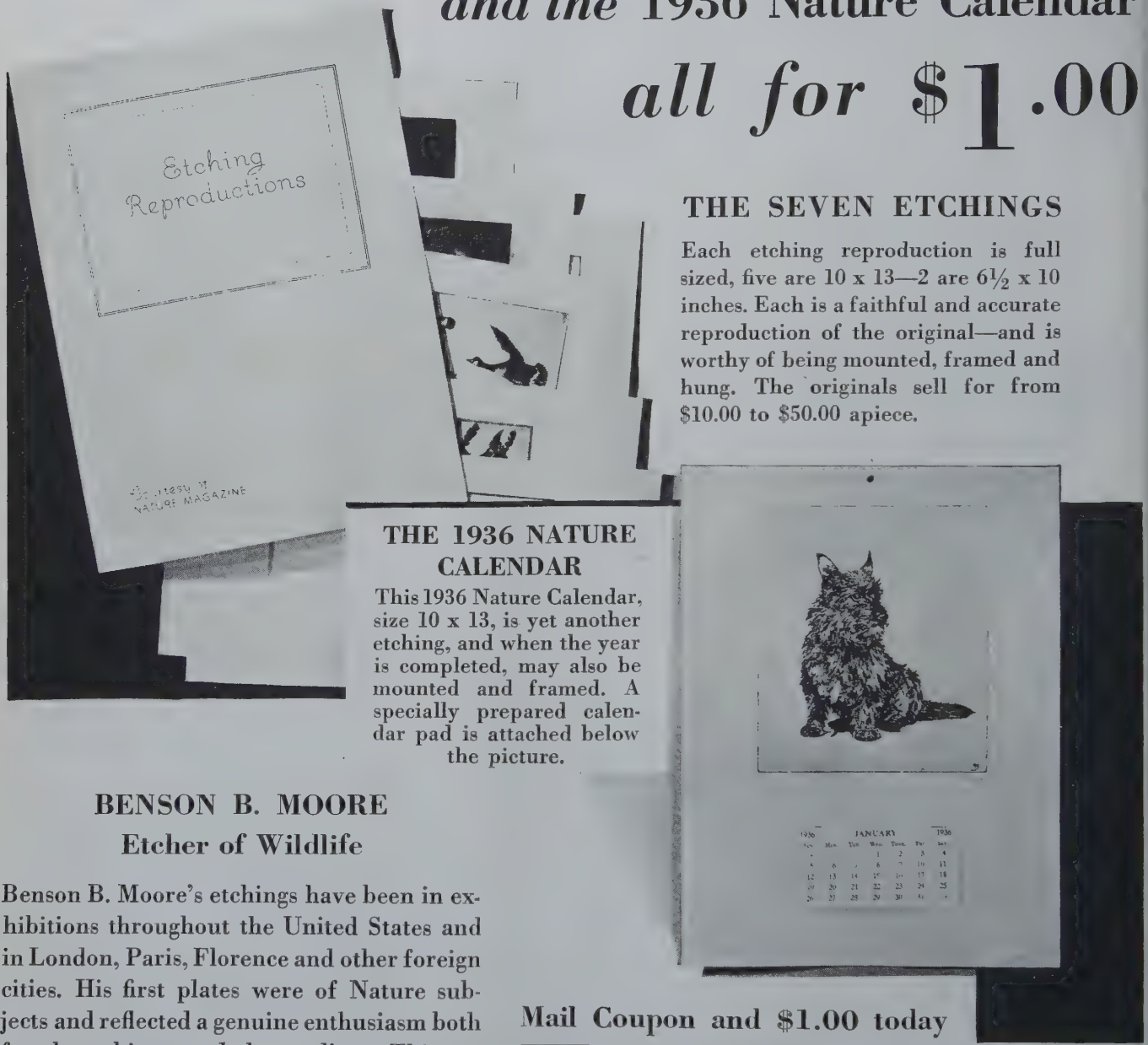

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For Rock Gardeners

From *Acaena* to *Zauschneria,* Clarence Elliott gives the experience of a lifetime of association with the plants that make the rock garden in his book *Rock Garden Plants.* He has chosen for discussion those plants that he knows intimately from his own experience and passes on to the reader many valuable hints on the cultivation of them, as well as other pertinent rock gardening advice on their use. The publishers are Longmans, Green and Company and the price is three dollars.

Arranging Flowers

Some people grow flowers only to adorn the garden but the majority draw upon their garden for home decoration. The adornment that flowers give to the home varies with the taste and abilities of the decorator. As an aid to this art F. F. Rockwell and Esther C. Grayson have collaborated on a helpful little volume entitled *Flower Arrangement.* In it they discuss what the title suggests from all points of view, including the best types of flower for cut-flower purposes, containers and holders, the keeping of cut flowers, use of material from the wild and other details. There are many excellent and useful illustrations. The book is published by Macmillan and the price is three dollars.

Economic Exploration

William LaVarre is an explorer who seeks out those things that people can use, wear, eat, drink or otherwise find valuable, and he has found it a fascinating and lucrative field. His adventures form the basis of a most entertaining volume entitled *Gold, Diamonds and Orchids.* From boyhood days in Virginia, LaVarre had cherished an overpowering desire to explore, and it was his professor of mineralogy who suggested that he might make exploring a money-making business. This he did, and his stories of how he did it provide many a thrill in this volume published by Revell at three dollars.

Other Books

Four Hedges, A Gardener's Chronicle: A beautifully printed and interestingly different garden book by Clare Leighton, who not only supplies the entertaining text but eighty-eight diverting engravings as illustration. Published by the Macmillan Company at three dollars.

Sierra Dreamers' House: An interesting collection of poems by Lucia Trent and Ralph Cheyney brought out by Poetry Publishers of Philadelphia at two dollars.

Concerning the Habits of Insects: Some fundamentals on insect collecting and the habits of bees, wasps, caterpillars, dragonflies and water beetles by F. Balfour-Browne. Published by Macmillan at one dollar and one half.

The World of Myths: A dictionary of mythology arranged geographically and providing a real and needed key to mythology. An excellent index makes it doubly useful. Written by Frank Chapin Bray and published by Thomas Y. Crowell Company at two dollars.

Profitable Enlarging and the Miniature Camera: The title is descriptive of the contents of this booklet by H. Rossiter Snyder, published by the Rossiter Snyder Publishing Company at fifty cents.

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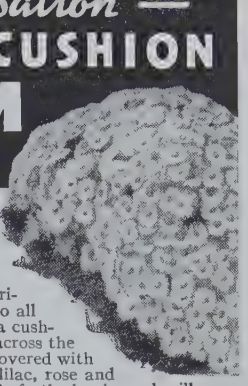

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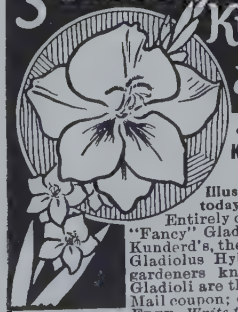

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A Beaver Story

Flat Tail, as one might suspect, is a beaver and he lends his name as the title of the latest book for the juvenile reader by Alice Gall and Fleming Crew. The story covers the second and most interesting year of this beaver's life, and into the drama of his existence is woven the always fascinating story of the manners and habits of these valuable mammals. Although we find here human dialogue placed in the mouths of animals, this is reasonably done and the whole book is written in charming style. Illustrations are provided by W. Langdon Kihn. The publisher is the Oxford University Press and the price is $1.50.

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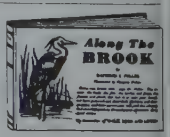

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Spider and Wasp

By Carl L. Johnson

An article that appeared in Nature Magazine for July, 1935, under the caption of "Hornets as Flycatchers" by Julian G. Patrick, stimulated me to send in a similar experience—with a difference. In this instance the hornet was a spider catcher. Believing that it is through the accumulation of individual experiences such as these that the sum total knowledge of insect or animal life may be amplified, the following brief incident is recorded.

One early June morning this summer I was seated on the veranda enjoying the freshness of the oncoming June day. Insect life of various forms was beginning to produce evidence that summer was at hand in real earnest. Spiders were at their labor, spreading ingeniously-woven, filmy traps in advantageous places. On the upper part of the window frame one such trap had been woven. My attention was attracted to it by a disturbance. A large black wasp, in a seemingly careless mood, had become entangled in the trap.

That such an intrepid individual should deliberately court death seemed incompatible with my understanding of the carnivorous habits of this killer. My suspicion was soon relieved of this doubt, when I saw what happened. The food gathering outpost erected by the spider proved to be its own death cell. Sensitive to the disturbance set up, and having its instinct for food gathering set in action by the commotion due to the wasp's presence, the spider came suddenly into view. It rushed upon the intruder. A terrible conflict resulted in which the wasp succeeded in enveloping its prey. Following this, a period of apparent quiet ensued. One by one there dropped from the scene bits of dark objects. These proved to be the legs and head of the spider. Finally, having amputated the various defense mechanisms of its would-be abductor, the cannibal thrust its proboscis into the pulpy abdomen of its victim and sucked out the jelly like morsel. This act seemed to be a tremendous sacrifice for such a brief luxury.

After this act of barbarity, the wasp deftly extricated itself, crawled to a nearby perch, preened itself, and set off for further depredations. Upon close examination of the remains of the dismembered parts, one was convinced of the unequalness of the conflict, and that the keeper of the death trap was doomed before the battle.

The Wax-Wing

By Julia Zanger

Some seasons ago there seemed to be innumerable flocks of cedar wax-wings, so friendly, with such a sweet little note, and their gray and brown plumage and their wing tips of red and yellow. One morning, among the current bushes, I discovered a grown bird with an injured foot. I caught it and did my best with repairing his foot. I put it in a cage on a side porch of the house and fed it the things I knew he loved to eat.

It was fall before the bird was fit to fly, but my father said, the birds had long since gone, and winter would overtake him, on his flight south. However, I opened the cage door, but he seemed reluctant to go. All day he stayed in the cage with the door open. Finally, before night, he was gone. However, to my astonishment, the next day I saw him feeding in his cage.

My childish pride was flattered. I thought he cared more for men than his companions. So he stayed the winter but when the fall came around again he flew away with his friends. Winter passed again, and the following summer he appeared. I always kept his cage ready for him, but after that summer, I never saw him again.

Photographic Notes

BY SAMUEL BROWN

During the cold weather, when many of us remain indoors, the photographer wonders what he shall do now. This writer has made it his habit to be out taking pictures whenever possible and has found that the only time he can catch up on his printing, enlarging, toning, coloring, etc. are those times when there is little in the way of picture opportunities outdoors, or when the weather forces him to remain at home. At these times it is startling to discover the work that has piled up. It is with the intention of filling up our readers' spare time with profitable photographic work that we dedicate this month's article to indoor activities.

The beauty of prints is much enhanced when appropriately toned and colored. They are a relief from the more conservative black and white. Prints to be toned should be made on matt or semi-matt paper. Glossy papers rarely yield good results. Several important rules should be observed in making prints for toning. They should be so exposed that they develop full, should be fixed in a new fixing bath containing little or no acid and hardener and, most important of all, should be thoroughly washed.

The simplest, most convenient and probably most inexpensive method for toning is to use prepared toners. These come in blue, green, sepia and copper ferrocyanide (purplish-red) and are available in tablet or liquid form.

Blue lends itself very well to water scenes, sky and clouds, moonlight scenes, and, most excellently, to snow scenes. Green is appropriate for pictures of trees, fields, etc. The copper toner is of little value by itself but can be used in combination with one or more of the other toners. Portraits and sunlit and autumn scenes look well in sepia.

A simple sepia toning bath may be made with chemicals usually at hand. The formula is as follows:

Hypo.....3 ounces
Alum (powdered).....½ ounce
Boiling water to.....20 ounces

The hypo should be dissolved first and then the alum added slowly while stirring. Allow to cool to about 120 degrees F., and, to prevent the first batch of prints from being unduly reduced, a few waste prints should be toned first to ripen the bath. Thereafter the solution may be used indefinitely. This bath improves with age. Best results are obtained when the toner is used at 120 degrees F. At this temperature toning takes about ten minutes. At a lower temperature toning time is considerably prolonged while a higher temperature gives a cold sepia tone. Prints to be toned sepia should be printed somewhat darker than is desired in the finished result as they are slightly reduced during processing.

Double toning is quite easily accomplished with the aid of shellac or varnish and denatured alcohol. For example, if green and sepia are the toners to be used, all that is necessary is to varnish all but the parts that are to be toned green. The print is then subjected to the green toning bath that will not affect the varnished parts. After toning, the print is dried and the varnish removed with the alcohol. The next step is to varnish those parts not to be toned sepia and the print is this time subjected to the sepia bath. After washing and drying, the varnish is removed and the print is finished.

THIS PICTURE IS ONE OF THE TYPE THAT WOULD BE MADE MORE ATTRACTIVE BY USING A BLUE TONING

Sometimes prints look well stained as a whole. Special stains in green, red and yellow are available. They can also be used in combination with the toners.

Another interesting supplementary working up of a print is to add clouds to cloudless scenes. All that is necessary is an artist's stub that can be made by twisting a piece of cotton on the end of a toothpick. Some graphite from the lead of a pencil is then ground by rubbing on a rough surface. The stub is rubbed into the graphite so that some adheres to it. The superfluous part is removed by rubbing on some waste paper. Clouds are worked on the print by making short, circular strokes on the sky with the stub. The whole sky is worked in in this manner and the clouds left white. After the print is finished the clouds cannot be recognized from genuine ones. This method is not suited for glossy prints as the graphite is removed as soon as the print comes in contact with anything.

A FEBRUARY MORNING—TAKEN ON VERICHROME, F 11, 1/25 OF A SECOND

An interesting pastime is to make line drawings from photographic prints. The print is made in the regular manner but must be well hardened in a solution made by dissolving one ounce of alum in a pint of hot water and then allowing it to cool. After hardening for a few minutes in the cold solution, the print is washed and dried. The line drawing is made on the surface of the print with "India Ink." When dry, the silver image is removed by immersing in the following bath. This will take from a quarter to half an hour leaving the line drawing undisturbed. The solution:

Thiocarbamide.....120 grains
Nitric Acid.....2 drams
Water to.....10 ounces

After the image has disappeared, wash for fifteen minutes and dry.

* * *

The Camera

While the lens and shutter of a camera are its heart and soul and upon them depends the greater part of the versatility of the camera, other parts, manipulations and movements add to the range of possibilities of the instrument. Higher priced cameras offer many refinements that are not found on less expensive ones.

Ordinarily the lens of a camera points squarely to the center of the film. In this position an equal angle of view is included from the bottom as from the top. The same holds true of both the right and left sides. In many cases, however, the lens is so mounted that the standard can be raised or lowered at will, thus including more at the top or bottom. This movement is called the *rising and falling front.* In addition to this,

(Continued on page 68)

Can You Re-Construct the "Rabbit-Murder" That Happened Here? ⟶

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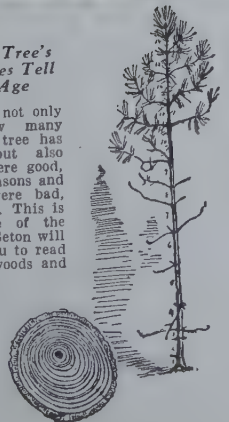

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PHOTOGRAPHIC NOTES

(Continued from page 66)

the *cross-front movement* is also found on this type of camera which permits the standard to be moved either left or right as occasion demands.

The main functions of the rising and falling front movement are to include either more sky, more foreground, to photograph tall subjects from a comparatively short distance without tilting the camera upward or to take pictures from a high point of view without pointing the camera down. The cross-front movement has the same functions when the camera is used in a horizontal position.

If a picture of a tall tree or group of trees were wanted, it would be necessary to photograph them from a considerable distance to include the top in order to avoid pointing the camera up. However, if the lens standard on the camera were raised it would be possible to take the picture from a shorter distance, thus utilizing, in a practical manner, more of the film space. In addition, a more natural perspective is obtained.

One other feature, usually found on cameras which afford ground glass focusing, is the double extension bellows. This is especially valuable to the naturalist who photographs small subjects, such as insects, etc. It is necessary when copies are to be made, as an extension double the focal length of the lens is needed to photograph anything life size. Double extension bellows also permit the use of a *distar* on the lens. Distars increase the focal length of the lens, thereby allowing a large picture of a distant scene.

* * *

"Trade Hints and New Books"

"Photographs In Color By Toning And Staining" is a complete, illustrated article on the use of toners and stains for obtaining pictures in colors. The proper technique to be employed is thoroughly discussed. Some suggestions give a lead as to possibilities, and the proper materials for this type of work are recommended. Available from this department for a stamped, self-addressed envelope.

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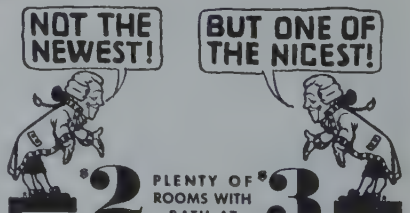

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n colors entitled *"Give Your Prints The Realism Of Color"* gives further information on the use of chemicals for converting a black and white print into a colored one. This is supplied with a supplementary list of prepared chemicals in "TABLOID" and "SOLOID" form for this work. Address this department and enclose a stamped, self-addressed envelope with your request.

* * *

"Leica Photography", a monthly periodical devoted to miniature camera technique, has been enlarged, more pages added, together with a new front cover. It is profusely illustrated and attractively printed on good paper. Send for a sample copy to the publishers, E. Leitz, Inc., 60 East 10th Street, New York, N. Y.

* * *

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"Adventures In Free Lance Newspaper Feature Writing" is a booklet giving the story of one person who discovered a profitable and fascinating pastime with camera and typewriter, and some of his methods. Full details and price from the author, Alfred H. Holden, Forest Hill, Tenn.

* * *

"My First Ten Years With The Leica" by Dr. Paul Wolff is a history of ten years of adventures in every part of the world with a Leica camera. Dr. Wolff is an expert on miniature camera technique and he discusses his methods in detail. Of particular interest to me was the procedure he uses in developing miniature film to obtain fine-grain negatives. The text, with reference to the two hundred full page illustrations, is divided into nine pictorial groups. The Nature photographer will be pleased with "The Landscape", "Animals and Plants" and "The Seasons—The Mountains". The book is large, has 55 pages of text and 200 full page illustrations. Publishers, B. Westerman Co., Inc., 13 West 46 Street, New York, N. Y., price $5.00.

* * *

The photographic department of NATURE MAGAZINE is devoted to its readers interested in photography and maintains a service which renders assistance in any photographic matter. You are invited to take advantage of this service. Cordially,

SAMUEL BROWN

Educational Films

After an extensive study the American Council on Education, 744 Jackson Place, Washington, D. C., has recommended the creation of an American Film Institute as a means to coordinating material and advancing visual education. In connection with this the Council wishes to reach all persons owning motion pictures and allied visual and auditory aids to education. Space does not permit our going into detail relative to the study preliminary to this program, but full information may be obtained at the above address.

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BELL TELEPHONE SYSTEM

In February

CONCERNING February the first thing that must be said is that the interest of the outdoors person in the changes that make up the cycle of the seasons is most *intent* during this month, most anxious, and uniquely characterized by suspense. Memories and records of other years only make one more certain of the month's uncertainties. So nearly unpredictable, indeed, are the uses Nature may make of these twenty-eight or twenty-nine days that the whimsical popular interest in the possibilities of Groundhog Day seems thoroughly in harmony with human nature—superstition, as always, easing the pain of ignorance.

Month of winter, month of early spring, or month of transition, February in its beginning is most likely in any case to be a bit of winter, and these early days of the month may afford the last experiences of this season's stormy weather that will come before one has again lived through the "heat o' the sun" in summer. Snow and cold weather may, however, last throughout the month and make it seem a lengthening of January. It was, in fact, in February—on the twelfth—that Thoreau in 1854 found winter in perfection and, enumerating the requirements of that state of Nature, wrote in his journal: "You must have a clear, sparkling air, with a sheen from the snow, sufficient cold, little or no wind; and the warmth must come directly from the sun. It must not be a thawing warmth. The tension of Nature must not be relaxed. The earth must be resonant if bare, and you hear the lisping tinkle of chickadees from time to time and the unrelenting steel-cold scream of a jay, unmelted, that never flows into a song, a sort of wintry trumpet, screaming cold, hard, tense, frozen music, like the winter sky itself."

Should an undue lingering of this perfection, however, make one a bit restive in the uplands in which he is at home, a week-end at the sea shore will add fresh interest to the season. Summer's crowds, who have used and will again use the shore as a resort, are gone. Wildness has returned. Even the house mice, attracted to the favorable environment provided by those who live in cottages in summer, have become creatures of the wild again, burrowing in the dunes, living upon weed seeds and the sea's debris, and making tracks in the sand. As pleasing in their delicacy as those of wood mice in the snow, these tracks of the house mice, again like those in the winter forest, may intersect the trails of other species. The gulls' duck-like prints and sparrows' small marks show where these birds have spent a few moments on the sand, and perhaps some of the small tracks may be those of the wildly secretive Ipswich sparrow that breeds on Sable Island, Nova Scotia, and spends its winters between the sea and the fringe of bay-berries along our Atlantic coast—a winter range of little extent from east to west but one of wide latitude. Looking up from the prints on the sand, one's eyes are sure to be entranced by the flight of gulls—and perhaps delighted by a surf scoter riding heavy seas or making its submarine way through the breakers.

Inevitably, along the beach, the sea shells will tempt the collector in one—and exasperate, as the limitations of pockets make unavoidable the apparently impossible task of selecting only the most pleasing. Of greatest interest, probably, are the coiled shells of the giant whelks, in which one can carry home with him the roar of the sea. The smooth-surfaced knobbed whelk has around its shoulders tell-tale protuberances that distinguish it from the rough-skinned channeled whelk that lacks these prominent knobs. And like hand-soiled white checkers threaded on a cord, the egg cocoons of these whelks can hang about one's neck when arms and hands and pockets are filled with shells.

Thought or remembrance of the sea shore in February may also recall accounts that others have written of some far-away desert flora starting to life at this season. In the Southwest, the Colorado desert, for instance, making the most of its meagre early spring rainfall, begins during this month a short period of blossom time that would delight with amazement any who think of our American deserts as only barren wastes without life or interest. For, in this land of cactuses, Joshua trees, rabbit brush, kangaroo rats, lizards, cactus wrens, and road-runners, there are hundreds of small flowering plants—pink verbenas, desert sunflowers, desert mallows, coreopsis, gilias, and dozens more—that begin in February to bloom along with the yuccas; the cactuses with their delicate, exquisite flowers for a plant so grotesque; and the startling ocotillo with its scarlet tubular blossoms.

But life may also be found stirring anew in one's own upland fields or woods. Snow fleas on thawing drifts, and possibly, in more southern latitudes, water-striders on the surface of quiet places in the streams, arouse a new interest in the insect world. Should the month prove mild, the song sparrow's notes will be heard again in fields, along once more with the meadowlark's plaintive whistle and the bluebird's friendly song. Some day, too, the first robin may suddenly appear on the lawn where the snow has melted. And even though the snow stays the month out, the skunk-cabbage—foremost in the vanguard of on-coming spring—is sure to send its blossom above ground on the edge of meadow or swampy place. Like a monk's hood colored in a worldly fashion in purple, striped with yellowish green, this leafless blossom stands serenely, not swaying with any wind, holding undisputed among the flora of our land its title of first of all the harbingers of spring.

By HOWARD ZAHNISER

"A SPEARHEAD OF MALLARDS DRIVES WESTWARD, SEEKING, I KNOW,
HARBORAGE FOR THE NIGHT IN ONE OF THE GREAT RIVER SWAMPS"